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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 52798 - 53380.

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AIR POLLUTION ABSTRACTS

VOLUME 6, NO. 12 DECEMBER 1975

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Acknowledgement is given to the Technical Publications Branch, Informational Services Division, Office of Administration, Research Triangle Park, N.C. for the make-up of the cover and for arrangement of printing and distribution.

Feedback from our users, including suggestions of articles, are always welcome.

APTIC Publications

Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:126, $0.65.

Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts, June 1973 GPO No. EP 4.9:125, $0.70.

Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts, March 1973, GPO No. EP 4.9:121, $2.35.

Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:119, $0.90.

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Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

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STUDY OF CHROMOSOMAL ABERRATIONS IN PERIPHERAL LYMPHOCYTES OF MAN AS A FUNCTION OF EXPOSURE TO ENVIRONMENTAL OZONE.
University of Utah Research Institute, Utah Biomedical Test Laboratory, 520 Wakara Way, Salt Lake City, Utah 84108

Contract No. 68-02-2274, RFP No. Du-76-B002 .... *$298,959*
A STUDY TO DETERMINE THE INTERACTIONS OF VARIOUS AIR POLLUTANTS ON CAUSATION OF PULMONARY DISEASE.
IIT Research Institute, 10 West 35th Street, Chicago, Illinois 60616

Contract No. 68-02-1761, Modification No. 1 .... *$49,241*
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Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

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The Research Corporation of New England, 125 Silas Deane Highway, Wethersfield, Connecticut 06109

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SURVEY OF COMPLIANCE STATUS AND STUDY OF AIR POLLUTION PROBLEMS AND CONTROLS AT PETROLEUM REFINERIES.
Pacific Environmental Services, Inc., 1930-14th Street, Santa Monica, California 90404

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The Franklin Institute Research Laboratories, Benjamin Franklin Parkway, Philadelphia, Pennsylvania 19103 (NOTE: Contract contains options in the amount of $60,856)

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The Aerospace Corp., P. O. Box 92957, Los Angeles, California 90009

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EVALUATION OF ANALYTICAL METHODS FOR MEASURING TRACE ELEMENT EMISSION AND ATTRITION PRODUCTS IN MAMMALIAN TISSUE.
Stewart Laboratories, Inc., 5815 Middlebrook Pike, Knoxville, Tennessee 37921

Contract No. 68-02-1377, Task Order No. 8 .... *$50,000*
A STUDY OF SULFUR DIOXIDE AROUND THE MORGANTOWN, MARYLAND AND CHESTERFIELD, YORKTOWN AND PORTSMOUTH, VIRGINIA POWER STATIONS (ESECA REVIEW).
Walden Research, Division of ABCOR, Inc., 201 Vassar Street, Cambridge, Massachusetts 02139

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THE PHYSICAL-CHEMICAL BEHAVIOR AND RESPIRATORY EFFECTS OF OXIDES OF SULFUR-AEROSOL MIXTURES.
University of Washington, Seattle, Washington 98195

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Tri-State Regional Planning Commission, One World Trade Center, 82nd Floor, New York, New York 10048

Contract No. 68-02-2123, RFP No. Du-75-A185 .... *$135,388*
BLAST FURNACE CAST HOUSE EMISSION CONTROL TECHNOLOGY DEVELOPMENT.
Betz Environmental Engineers, Inc., One Plymouth Meeting Mall, Plymouth Meeting, Pennsylvania 19462

Contract No. 68-02-1382, Task Order No. 12 .... *$39,956*
COMPILATION OF LITERATURE REFERENCES CITING EMISSION LIMITATIONS FOR VARIOUS SOURCE CATEGORIES.
TRC, The Research Corporation of New England, 125 Silas Deane Highway, Wethersfield, Connecticut 06109

Contract No. 68-02-2277, RFP No. Du-75-B107 .... *$167,040*
AIR POLLUTION ANALYZER TESTING AND TECHNICAL SUPPORT FOR REFERENCE AND EQUIVALENT METHOD DETERMINATIONS.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

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United Technologies Corporation, Pratt and Whitney Aircraft Division, Florida Research and Development Center, P. O. Box 2691, West Palm Beach, Florida 33402

Contract No. 68-02-0629, Modification No. 10 .... *$49,775*
COAL CONVERSION SYSTEM TRANSIENT POLLUTANT EVALUATION.
Exxon Research and Engineering Company, P. O. Box 8, Linden, New Jersey 07036

Contract No. 68-02-1378, Task Order No. 20 .... *$27,989*
ANALYSIS OF IMPACT OF NONSIGNIFICANT DETERIORATION REQUIREMENTS ON STATE OF SOUTH DAKOTA.
Pacific Environmental Services, Inc., 1930-14th Street, Santa Monica, California 90404

Contract No. 68-01-2787, Modification No. 5 .... *$5,970*
NEGOTIATIONS WILL BE CONDUCTED WITH INTEGRATED SYSTEMS SUPPORT, INC., FOR ADDITIONAL SUPPORT FOR THE OPERATION OF THE UNIVAC 1110 COMPUTER AT RESEARCH TRIANGLE PARK, N. C.
Integrated Systems Support, Inc., 7929 West Park Drive, McLean, Virginia 22101 (NOTE: Contract contains options in the amount of $97,214)

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1975

52798 **APTIC NO. 77407**

Amemiya, Tozo, Hiroshi Miyake, Akira Yokogawa, Mitsuyuki Mitooka, Shigeo Mitsui, Katsuji Ishibashi, Jun-ichi Kawabata, and Yoneshiro Tazaki

GRANULAR ACTIVATED CARBON PRODUCED FROM ASPHALT. *Bull. Japan Petrol. Inst., 17(1):143-149, April 1975. 11 refs.*

A process for preparing granular activated carbon from petroleum residues such as asphalt is described. The process consists of three steps: char production, char activation, and exhaust gas treatment. A co-current, two-step fluidized bed furnace is used for activating the char which is obtained from treating asphalt with sulfuric acid. The sulfur dioxide-containing exhaust gas generated from the char producing step is catalytically oxidized to sulfuric acid. Hydrogen sulfide generated from an alternate process is converted to elemental sulfur by a Claus unit. The product possesses good adsorption characteristics and is relatively inexpensive to manufacture. The yield of activated carbon from asphalt ranges from 30-45 wt% as compared to a yield of 20% when coal is used to generate activated carbon.

52799 **APTIC NO. 76837**

Boschan, Eva and Istvan Goncz

GAS FIRING EQUIPMENT AND AIR POLLUTION. *(Gaztuzelo-berendezesek es a legszennyezes). Text in Hungarian. Energiagazdalkodas, 16(2):66-70, Feb. 1975. 6 refs.*

Problems of air pollution by domestic heating and other gas-firing equipment are studied. City gas, containing 200 mg sulfur/N cu m, emits 28 ppm sulfur dioxide, while propane-butane gas and natural gas emit SO2 in concentrations around the natural background level. Nitrogen oxides are formed at temperatures above 1500 C, and mostly at an air-excess coefficient of 1-1.2; the nitrogen oxides formation decreases at higher air excess coefficients. Nitrogen dioxide emitted by gas-firing equipment, especially those not connected to a chimney, may cause health hazards as it may be emitted in concentrations up to 100 ppm against a minimum allowable concentration of 5 ppm. Carbon monoxid,, formed during low flame temperature and incomplete combustion, (when practically no nitrogen oxides are formed), is limited to 500 ppm for firing equipment not connected to chimneys, and to 0.1% by volume for equipment connected to stacks.

52800 **APTIC NO. 77368**

Cronewitz, Th., G. Mueller, B. Bissinger, and F. Stadler

INVESTIGATION OF THE INFLUENCE OF SOME FACTORS ON ENERGY REQUIREMENTS AND DUST PRODUCTION IN PULP DRYING PLANTS, ESPECIALLY WITH REGARD TO THE RETENTION TIME OF THE PULP. *(Ueber den Einfluss verschiedener Groessen auf den Energiebedarf und die Staubemission von Schnitzeltrocknungsanlagen unter Beruecksichtigung des Verweilzeitverhaltens der Schnitzel waehrend der Trocknung). Text in German. Zucker, 28(8):401-410, 1975. 11 refs.*

In order to determine the specific fuel requirements, 63 experiments were performed during two campaigns on two oil-fired pulp dryers which had the same dimensions (diameter 3.25 m and length 17.0 m) but slightly different mountings. Experiments showed that the heat efficiency is optimal in the range of specific evaporation (Vs) equals 160 to 190 kg/cu m times height), whereas the specific fuel requirement increased progressively with increasing dryer load at a constant amount of boiler flue gas addition. The heat transfer from hot air to pulp increases with increasing specific evaporation, whereas the heat transfer from the mountings to the pulp decreases. The average retention time of the pulp was found to be between 40 and 130 minutes and is determined mainly by the gas velocity inside the drum.

52801 **APTIC NO. 76759**

Danowski, W. and J. Kieser

CHEMICAL REACTIONS IN THE ZAB PREHEATER UNDER HIGH ALKALI LOAD. *(Chemische Reaktionen im ZAB-Vorwaermer bei hoher Alkalibelastung). Text in German. Zement-Kalk-Gips (Wiesbaden), 28(2):68-71, 1975. 5 refs.*

In the dry-process cement burning plants with Dassau Cementworks (ZAB) pre-heaters, the occurrence of alkali cycles, especially chlorine cycles, was not so localized in the kiln inlet region as in those cement plants equipped with cyclone preheaters. The tendency to form incrustations or coatings was only slight, even at an alakli intake rate of about 20 g potassium oxide/kg of clinker. Incrustation deposits were observed only in cases of prolonged operational trouble involving an interruption of raw meal feed and were found to contain spurrite phase. In general, the ZAB pre-heater behaved in an insensitive manner with regard to high alkali loading rates. There was a low level of sulfur dioxide emission, which did not begin until the overall sulfur trioxide intake exceeded 10.8 g sulfur trioxide per kg of clinker.

52802 **APTIC NO. 77351**

Fennelly, Paul F.

PRIMARY AND SECONDARY PARTICULATES AS POLLUTANTS. *J. Air Pollution Control Assoc., 25(7):697-704, July 1975. 56 refs.*

Primary and secondary particulates are discussed with respect to their size distribution, origin, and chemical composition. Primary particulates are particles that are injected directly into the atmosphere. Usually their sizes are within the range 1-20 micron. Common sources are windblown soil, industrial emission, and combustion systems. Examples of typical primary particulates are soot, pollen, fly ash, and dust. Secondary particulates are relatively small; their size range is 0.01 to 1.0 micron. They can be generally classified as sulfate, nitrates, or hydrocarbons. Secondary particulates are formed as a result of atmospheric reactions involving gaseous species such as sulfur dioxide, nitrogen oxides, oxygen, ammonia, water, and hydrocarbons. The proposed mechanisms for a number of these reactions are outlined and their relative importance is discussed. The impact of both primary and secondary particulates on health and esthetics is discussed. (Author abstract modified)

52803 **APTIC NO. 77346**

Frohne, Johann-Christian and Peter Kappe

MEASUREMENT AND EVALUATION OF HYDROCARBON IMMISSIONS. II. DIFFERENTIATED STATISTICAL EVALUATION OF IMISSION MEASUREMENTS BY MEANS OF EDP. *(Messung und Auswertung von Kohlenwasserstoff- Immissionen Teil II. Differenzierte statistische Auswertung von Immissionsmessungen mittels EDV). Text in German. Staub, Reinhaltung Luft, 35(8):308-314, Aug. 1975. 6 refs.*

A procedure is described for a differentiated evaluation of a large number of hydrocarbon immission measurements. Partial quantities of these measurements, characterized by different external conditions such as location, time, and weather are assorted by means of a computer program. Subsequently statistical characteristics are ccalculated for these quantities, such as averages, standard deviations, confidence limits, immission factors, and frequency distributions. Such a procedure allows immission loads to be considered under differentiated aspects, facilitating conclusions to be drawn concerning emission sources, propagating phenomena, and special load situations.

52804 **APTIC NO. 76783**

Goto, H. and T. Kato

INVESTIGATION OF VANADIUM IN EXHAUST GASES FROM STATIONARY SOURCE. *(Kotei hasseigen ni okeru banadium no haishutsu). Text in Japanese. Hokkaido Kogai Boshi Kenkyusho Ho (Rep. Hokkaido Res. Inst. Environ. Pollut.), no. 1:83-85, March 1975.*

Stack gas was sampled by constant-velocity suction using a quartz cylinder with Toyo no. 88R filter paper. The filter paper was dried at 120 C for 1-2 hr and was weighed. After oxidation treatment, the sample solution (diluted with nitric acid solution (2.98) to constant volume) was treated with 1% potassium permanganate solution and was extracted with BPHA solution. The vanadium concentration was determined by measuring the absorbance of the solution near 440 nm. Thhe V contents of heavy oils were as follows: A heavy oil, 56 micrograms/g; B heavy oil, 66 micrograms/g; C heavy oil, 55 micrograms/g; and D heavy oil, 65 micrograms/g. The V contents in dusts from a coal-firing boiler, and drying furnace were 250-900 micrograms/g, 7500-35,000 micrograms/g, and 210-2600 micrograms/g, respectively.

52805 **APTIC NO. 77524**

Hiroyasu, Hiroyuki, Keichi Kakuda, Shinji Ikura, and Kenichi Kashiwabara

SIMULATION OF COMBUSTION AND DISCHARGED GAS OF DIESEL ENGINES. I. ANALYTICAL MODEL AND PROCEDURES OF CALCULATION. *(Diesel kikan no nensho to haiki simulation. I. Kaiseki model to keisan tejun). Text in Japanese. Preprint, Japan Society of Automotive Engineers, Tokyo, p. 15-24, 1975. (Presented at the Japan Society of Automotive Engineers Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

A heat-evolving and a discharged-gas-forming model of a diesel engine are proposed. The former is used to study on the rate of combustion, the pressure in the cylinder, and the temperature change. The latter is used to estimate the concentrations of the combustion products in the discharged gas. Fuel injected from a nozzle forms minute particles and then forms a cloud when it is mixed with air. The front of the cloud advances off the tip of the nozzle. The travel and the size of these cloud particles are analyzed. The particles also evaporate in the course of travel. Finally the ignition takes place because of the temperature rise due to compression. The combustion consists of precombustion and diffusion combustion. The combustion of the fuel is controlled by two factors: the rate of fuel evaporation and the rate of mixing of air with the igniting gas. The former factor is calculated from the temperature in the element and the concentration of vapor. The latter is determined by observation of the photograph of the igniting gas. The collision of injection fuel and igniting gas with the wall of the cylinder and the surface of the piston are taken into consideration. The effect of the eddy current of air is also discussed. The temperature of the flame and the formation of nitric oxide and black smoke are also treated.

52806 **APTIC NO. 77401**

Hitchcock, Dian R.

DIMETHYL SULFIDE EMISSIONS TO THE GLOBAL ATMOSPHERE. *Chemosphere, 4(3):137-138, June 1975. 7 refs.*

Emissions of dimethyl sulfide from leaves, soils, and marine algae to the global atmosphere are discussed. The total annual global dimethyl sulfide sulfur emissions are unlikely to exceed 5 million tons and are probably closer to 2 million. The principle source of global emissions is soils with 1.5 to 4.9 times 10 the 12th power g of S/yr, followed by senescent leaves with .53, marine algae .05, and intact leaves .01 times 10 to the 12th power g of S/yr. If the reported dimethyl sulfide emission rates are approximately correct, then dimethyl sulfide cannot be the major source of the biological S which cycles through the atmosphere. The only other significant biological source of atmospheric S is hydrogen sulfide produced by anaerobic metabolism of the sulfate reducing bacteria Desulfovibrio desulfuricans.

52807 **APTIC NO. 76908**

Honma, Makoto

PRESENT STATUS AND PROBLEM OF CADMIUM POLLUTION. *(Kadomiumu osen no genjo to mondaiten). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo (Japan), p. 126-127, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

The pollution of the environment by cadmium is classified into 3 groups. The first is the pollution of the atmosphere, which results in the pollution of soil in the neighborhood of the factories. The second is the pollution of rivers, which causes highly polluted rice fields. The third is the complex of the first and the second. About 2956 tons of cadmium was produced in Japan in 1972. Of this amount, 1825 tons was consumed in Japan for the production of pigments, stabilizers, and dry cells. Most of these products are not recovered and reused again, but pulverized in the use or after the use. Cadmium is detected in high concentrations in all parts of Japan. The cadmium content of the skin of average Japanese is reported to be higher than that in the skin of the people in the foreign countries. Both FAO and WHO reported that an average Japanese eats 400-500 micrograms of cadmium a week. If this cadmium is attributable to rice only, the average content of acadmium in rice is calculated to be 0.14 ppm. The recovery of used products containing cadmium is strongly recommended to prevent various diseases such as itai-itai disease.

52808 **APTIC NO. 77507**

Hosokawa, Y., S. Izumi, M. Chinda, H. Uchiyama, M. Ito, K. Negishi, and K. Takahashi

ON THE HEAVY METAL POLLUTION IN THE SOIL AT HACHINOHE AREA. *(Hachinohe chiku ni okeru dojo no jukinzoku osen). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rept. Environ. Pollut. Control Center, Aomori Prefect.), no. 1:72-81, Feb. 1975.*

Heavy metal concentrations in the soil of the sea bank industrial area of Hachinohe City were measured on July 30 and July 31, 1973. Soil on the surface no deeper than 10 cm was dried and sieved. For the analysis of mercury, 10-20 g of the sample were heated with a mixture of sulfuric acid and nitric acid and after treatment with urea, potassium permanganate, and hydroxyamine hydrochloride, the Hg concentration was determined by atomic absorption. Arsenic in the sample was analyzed by the colorimetric method with brucine-chloroform after treatment with H2SO4-HNO3-perchloric acid and 1N hydrochloric acid. For the analysis of iron, lead, copper, cadmium, zinc, and manganese, 5 g of the sample was treated with HNO3-HClO4 and 1N HCl, and Fe, Mn, and Zn were analyzed directly by atomic absorption while Pb, Cu, and Cd were extracted with diphenylthiocarbazone-chloroform and then analyzed by atomic absorption. The heavy metal concentrations were significantly higher than those in residential areas and farmlands. The average Fe, Hg, As, Pb, Cu, Cd, Zn, and Mn concentrations in the soil of the industrial area were 4.05%, 0.33 ppm, 29.5 ppm, 127.5 ppm, 282.4 ppm, 1.80 ppm, 866 ppm and 891 ppm, respectively. The high concentrations were attributed to the airborne particulates emitted by various plants.

52809 **APTIC NO. 77371**

Ito, Tetsuya

RECENT YOKKAICHI INDUSTRIAL COMPLEX: OPPRESSIVE ENTERPRISES AND PRESENT SITUATION OF ENVIRONMENTAL POLLUTION AND DISASTERS. *(Saikin no yokkaichi konbinato: Shi zaisei no kuiarashi to ko-kogai no genjo). Text in Japanese. Keizai (Econ.), no. 137:86-99, Sept. 1975.*

Envirommental pollution problems caused by petroleum and petrochemical industrial complexes are discussed with the case of Yokkaichi city where three such complexes are located. Data on the location, production activity and production capacity are compiled and analyzed. The relationship between the city finance and the existence of the industrial complex is discussed with data. The present status of the environmental pollution related to industrial complex concerning sulfur oxides, nitrogen oxides, oxidant and other pollutants is reviewed. Data of storage and handling of explosives and other dangerous materials are compiled and analyzed in reference to possible disasters. After the 1972 Yonemoto Decree in favor of the citizen s claim, the total emission quantity control systems for sulfur oxides (1977 target value of environmental concentration 17 ppb), nitrogen oxides (1974) and chemical oxygen demand (1974) were introduced, and the citizen s movements were intensified. The policy of making the information concerning technical aspects and cost accounting public is necessary for democratic control of industries rather than the monopolistic control by industries victimizing citizens. The registration system for new factory construction was changed to the permit system based on the environmental standard, and other control ordinances were issued for stricter pollution control.

52810 **APTIC NO. 77301**

Jinbo, G.

AIR POLLUTION BY HEAVY METALS AND DUST COLLECTION. *(Jukinzoku osen to shujin). Text in Japanese. Kagaku Kogyo (Chem. Ind.), 19(2):58-59, Feb. 1975.*

A relationship between cement industries and air pollution by cadmium was pointed out by thee Environmental Department of the Mie Prefecture, which announced that air pollution by cadmium in the Fujihara district is attributed to natural pollution plus dust discharged from a cement factory. Cadmium is present in raw material, limestone, limestone in which other materials are mixed, and manufactured cement in the order of 0.7 to 0.9, 1.7 at maximum and 0.3 ppm, respectively. The cadmium content of cement dust on tiled rooves of houses in the neighborhood reached 14 to 50 ppm. Dust in the waste gas from a kiln that has a low metal content is collected selectively, while that which has a high metal content is collected by an electrostatic precipitator. A thermal process may be used to condense heavy metals.

52811 **APTIC NO. 76785**

Kamimoto, T., S. Matsuoka, Y. Aoyagi, and Y. Matsui

STUDIES ON COMBUSTION OF THE DIRECT INJECTION TYPE DIESEL ENGINE. *(Chokusetsu funsha shiki dizeru kikan no nensho ni kansuru kenkyu). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, p. 35-38, 1975. (Presented at the Japan Society of Mechanical Engineers, Lecture Meeting, Tokyo, Japan, April 1-3, 1975.)*

Thermodynamic analysis for the diffusion combustion period of a diesel engine was carried out by varying injection quantity, injection time, engine speed and air temperature, and their relationships with exhaust NOx concentration and exhaust temperature were discussed. The direct injection engine had a 92 mm bore and 4 injection nozzles with a nozzle diameter of 0.2 mm and one stroke of 110 mm. N-dodecane was used as fuel and the flame temperature was determined by the dichromatic method at 0.53 and 0.74 micron. The maximum flame temperature was independent of the maximum pressure and the flame temperature at constant ignition time was also independent of engine speed. The combustion rate was approximately proportional to the engine speed and had a linear relationship with the air introduction rate. The NOx concentration and exhaust temperature decreased with increasing excess air ratio.

52812 **APTIC NO. 77442**

Kaufmann, Erhard, Lothar Eremit and Herbert Mohry

AIR HYGIENE PROBLEMS IN PETROCHEMICAL PLANTS. *(Lufthygienische Probleme in petrolchemischen Anlagen). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. 10:71-101, 1975.*

The petrochemical industry, which has developed rapidly in the last few years in order to produce plastics and synthetic fibers, has produced a structural change within the chemical industry, thus gaining special importance with regard to environmental protection. Compared with the carbo- and carbide chemical processes, the petrochemical processes are relatively non- polluting. Some of the petrochemical syntheses presently in use in the German Democratic Republic are described, as well as the conversion possibilities of petrochemical raw materials. The generation and non-detrimental reduction of emissions are described, with special emphasis on the acquisition and thermal destruction of toxic and odorous waste gases.

52813 **APTIC NO. 76781**

Kitagawa, Y. and A. Furukawa

RESULTS OF BAD ODOR INVESTIGATION AT A VULCANIZATION ACCELERATOR- MANUFACTURING FACTORY. *(Karyu sokushin-zai seizo kojo no akushu chosa seiseki ni tsuite). Text in Japanese. Yamaguchi- ken Eisei Kenkyusho Nenpo (Annu. Rept. Yamaguchi Prefect. Inst. Health), no. 16:86-87, March 1975.*

An investigation of hydrogen sulfide, carbon disulfide, and odor degree was carried out by a sulfur manufacturer of sulfur for vulcanization accelerators from July 9 to July 13 in 1973. The H2S and CS2 were determined by gas chromatography with flame photometry while odor degree was determined by the 6 degrees (0-5) method. The concentrations of H2S and CS2 in stack gas were always high at 400,000 to 560,000 ppb and 110,000 to 210,000 ppb, respectively. The average concentrations at 11 locations in the factory were 140 ppb and 55 ppb, respectively, and the average degree of odor was 3.6. The average concentrations at 9 locations from 800 m to 1300 m in the downwind direction of the factory were 2.1 ppb and 1.1 ppb, respectively, and the average degree of odor was 0.7. Answers of questionnaires distributed to the residents in the surrounding area revealed that the closer to the factory, the stronger was the odor and the more numerous were the complaints.

52814 **APTIC NO. 76825**

Komeno, Minoru, Shin-ichi Kohira, and Tsuyoshi Shimada

A SUPER-CRITICAL PRESSURE BENSON BOILER ADAPTED FOR VARIABLE PRESSURE OPERATION. *(Tokyo Denryoku K.K. Ohi Karyoku 3 go boira no gaiyo* *to sono unten jisseki). Text in Japanese. Kawasaki Giho (Kawasaki Tech. Rev.), no. 57:33-38, April 1975. 4 refs.*

The super-critical pressure Benson boiler adapted for variable operation installed at the Tokyo Denryoku Ohi Power Plant is the first of its kind, and has been operated successfully since Dec. 1973. The boiler specifications and characteristics concerning vapor pressure condition, variable pressure operation, spiral evaporator, evaporator recirculation system, turbine bypass system, control system for excessive boiler output, low oxygen burner, and nitrogen oxides emission control devices are described with flow sheets. The operation records are given with a description of vapor pressure characteristics, vapor temperature performance, variation rate of load and hot start-up performance, diagrams of boiler conditions during variable pressure operation, boiler pressure and temperature performance, spray characteristics, load-up curve, boiler allowable-load curve at load-up, and hot start-up curve after eight hours of unit stoppage. Tests results of NOx and particulate emission are also given.

52815 **APTIC NO. 77500**

Martinez, J. R.

AUTO EMISSIONS, ENGINE SIZE, AND FUEL ECONOMY. *J. Air Pollution Control Assoc., 25(7):735-738, July 1975. 15 refs.*

The relationships among auto emissions, engine size, and fuel economy are analyzed using certification test data published by the Environmental Protection Agency for 1973 and 1974 model light duty vehicles. There is no significant correlation between emissions of carbon monoxide, nitrogen oxides, and hydrocarbons and engine size. There is no advantage from an air pollution standpoint in substituting small cars for the larger vehicles, assuming that driving habits remain constant. Because of the inverse relationship between fuel consumption and vehicle size, a shift to smaller vehicles would be advantageous from energy conservation considerations. The frequency distribution of the emissions indicates that the mean level of emissions for hydrocarbons, CO, and NOx is appreciably lower than the standards. This could imply that estimates of automobile emissions based on the assumption that the average equals the standard will be pessimistic.

52816 **APTIC NO. 77466**

Neulicht, Roy

EMISSION CORRECTION FACTOR FOR FOSSIL FUEL-FIRED STEAM GENERATORS: CO2 CONCENTRATION APPROACH. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Emission Standards and Engineering Div., 11p., Jan. 1975. 14 refs.*

A method for calculating emission correction factors for fossil fuel-fired steam generators which is based on the F-factor approach and the use of a dilution correction factor obtained from measurements of carbon dioxide rather than oxygen concentration is described. Justification for the method is based on two facts: the comparison of the theoretical carbon dioxide produced during combustion with the measured carbon dioxide provides an exact basis for dilution correction; within any fossil fuel type category, the ratio of the volume of carbon dioxide to the calories released is essentially a constant. The method allows for the determination of emission rates from wet basis concentration measurements without recalculation of the correction factor. Another advantage of the method is that the use of carbon dioxide for correcting for dilution provides flexibility since an additional method for determining emission rates is available. A disadvantage of the carbon dioxide correction factor is that it cannot be used after control devices that alter the carbon dioxide concentration or in situations where carbon dioxide is added.

52817 **APTIC NO. 76789**

Ogawa, Toshihiro

THE EFFECT OF HUMAN ACTIVITIES ON OZONE IN STRATOSPHERE. *(Ningen katsudo no seisoken ozone ni ataeru eikyo). Text in Japanese. Preprint, Japan Society for General Research, Tokyo, Environmental Science Div., p 37-38, 1975. (Presented at the Japan Society for General Research, Environmental Science Division Meeting, 1st, Tokyo, Japan, June 6-8, 1975.)*

The effects of human activities on stratospheric ozone and ultraviolet radiation are discussed. The presence of ozone shields animals and plants from the harmful effect of ultraviolet rays. According to the United States Department of Transportation, about 500 supersonic planes will be flying in 1990, resulting in the liberation of about 500 million kg of nitrogen oxides in the stratosphere per year. This liberation can increase the amount of ultraviolet rays reaching the earth by 10-20%. Although NOx are produced in large amounts on the earth, most of the NOx are converted to nitric acid and nitric anhydride, which are removed from the atmosphere by rain. Thermonuclear explosions in the stratosphere generate several million kg NOx per 1 megaton. Hydrogen chloride transported from the surface of the earth to the stratosphere also destroys ozone. Freons also destroy ozone. Both trichlorofluoromethane and dichlorodifluoromethane are produced and consumed on the surface of the earth annually. Of this amount, about 100 million freon molecules penetrate the stratosphere per sq cm per sec.

52818 **APTIC NO. 77423**

Onozuka, Harukichi

THE HEAVY METAL POLLUTION BY PORTLAND CEMENT FACTORIES. *(Semento kojo kara no jukinzoku osen ni tsuite). Text in Japanese. Preprint, The Society for General Research on Environmental Science, Tokyo (Japan), p. 134-135, 1975. (Presented at the Preparatory Meeting of the Society for General Research on Environmental Science, the Lecture Meeting, 1st, Tokyo, Japan, June 6-8, 1975.)*

Samples were collected at 31 sites around the Japan Portland Cement Co., Hinodemachi, Tokyo. Cadmium, zinc, copper, and lead samples were collected from both the surface and the lower layers of the soil. Analysis was also done on harvested rice. The pollution around the factory was very high and decreased as the distance from the factory increased. The heavy metal content was high in the surface soil and low in the lower layer. The ratio between the contents decreased as the distance increased. At a point far enough from the factory, the ratio was almost 1. The pollution was heavy in the downstream of the predominant wind. Although the heavy metal concentration in harvested rice was less than 0.4 ppm, the effect of pollution was observed as far as 4 km from the factory.

52819 **APTIC NO. 76085**

Shinohara, Hiroshi, Kunihiko Masunaga, Hidetomo Umehara, and tadao Niibori

FUEL COMPOSITION AND THE EMISSION. COMBUSTION PRODUCTS AND THE SUBSTANCES ISSUED FROM THE FUELS. *(Nenryo sosei to emission. Sono nensho seisei butsu to nenryo kiin-butsu). Text in Japanese, Preprint, Japan Society of Automotive Engineers, Tokyo p. 101-104, 1975. (Presented at the Japan Society of Automotive Engineers Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

The relationship of engine exhaust composition to fuel composition was investigated. A Toyota 18 Type R engine was used at 1500 rpm. The fuel contents of olefins, paraffins, and aromatic hydrocarbons were varied, and the mixing of these was done so that the vapor pressure, distillation characteristics, and octane value of the fuel were the same. The components in the exhaust gas were determined by gas chromatography for 42 gasolines prepared in the above manner. The combustion products of paraffins were hydrocarbons with one to three carbons and olefins with four carbons. From aromatic hydrocarbons, benzene, toluene, and acetylene were formed. Combustion intermediates were saturated straight-chain aldehydes formaldehyde, acetaldehyde, unsaturated aldehydes, acrolein, aromatic aldehydes, benzaldehyde, and tolualdehyde. Of these compounds, aromatic aldehydes were the most photochemically active. Aromatic hydrocarbons appeared as combustion intermediates. Paraffins gave combustion products and intermediates, all of which were photochemically inactive.

52820 **APTIC NO. 77367**

Smidt, H.

GAS AND DUST EMISSIONS FROM SUGAR FACTORIES - TECHNICAL POSSIBILITIES OF REDUCING EMISSIONS WITH REFERENCE TO LOCAL AUTHORITY REGULATIONS. *(Ges-und Staubemissionen von Zuckerfabriken - Technische Moeglichkeiten zur Emissionsmidnerung unter Beruecksichtigung der behoerdlichen Vorschriften). Text in German. Zucker, 28(9):491-498, Sept. 1975.*

Emissions from sugar factories are grouped under gaseous and dust-type emissions. Main emission sources are the boiler plant and pulp dryer. The various levels and causes of dust emissions from solid fuel and oil firing are described. Gaseous emissions include sulfur oxides, nitrogen oxides, fluorine, and to a certain extent, hydrocarbons (odor emissions). Noxious gaseous emissions are indicated for a model factory with a beet-slicing capacity of 5000 tons/day. The effect of fuel, type of firing and operation is demonstrated. The technical possibilities of reducing emissions are tied up with legal requirements. Gaseous emissions cannot in practice be reduced by technical processes. Suitably high stacks must be erected for the distribution of emissions. With regard to sulfur dioxide, improvements can be made by fuel desulfurization. Dust emissions from pulp drying can be kept within reasonable limits by multi-cyclones.

52821 **APTIC NO. 76806**

Sudo, Hideo, Iwai Nobuo, Kobayashi Shinji, Masatake Yoshida, and Takahiro Tsuruga

STUDIES ON METHANOL ENGINES FOR AUTOMOBILES. PROPERTIES OF CYLINDER INJECTION, SPARK IGNITION ENGINES. *(Jidosha-yo methanol kikan no kenkyu. Cylinder funsha hibana tenka kikan no shoseino). Text in Japanese. Preprint, Japan Society of Automotive Engineers, Tokyo, p. 109-112, 1975. 2 refs. (Presented at the Japan Society of Automotive Engineers, Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

Properties of cylinder injection and cylinder cooling were investigated for a methanol engine. A four-stroke, single cylinder engine, equipped with an inside valve, was used at a compression ratio of 5.8. The direction of fuel injection was so determined that the flow of the fuel was directed toward the spark plug. In this case, the combustion took place most efficiently. The diameter of the nozzle was 0.25 mm. The injection was made at 20 deg after the upper dead point. The temperature of the cylinder head stayed almost constant, irrespective of the kind of the fuel. However, the temperature at the point of measurement, placed inside the cylinder, was low when methanol was used as a fuel and was high for gasoline. This difference was attributed to evaporation in the neighborhood of the intake valve. The injection of methanol onto the surface of the cylinder was also effective. In this case, the heat transferred to the cylinder wall was partly recovered as the evaporation of methanol and contributed to the improvement of the engine efficiency. It was possible to operate the engine by air cooling.

52822 **APTIC NO. 77521**

Sugimitsu, Santa, Masatoshi Kato, and Tsuneo Narita

A SUMMARY OF TAMASHIMA NO. 3 SUPERCRITICAL 500 MW UNIT. *(Tamashima Hatsudensho Dai-3-go ki 500 MW chorinkaiatsu puranto). Text in Japanese. Karyoku Genshiryoku Hatsuden (Therm. Nucl. Power), 26(7):729-742, July 1975.*

The Tamashima Power Plant No. 3 Supercritical 500 MW Unit, located in southern Okayama Prefecture, Japan, in operation since June 1974, is described. A high degree of automation is built into the plant for safety and efficiency. To conserve energy and lower power costs, a high capacity plant was built. As air pollution control measures, different blends of fuels can be used, and nitrogen oxides emission (goal, 150 ppm) is reduced by gas mixture control and two-stage combustion processes. Waste water treatment facilities have been completed. Desulfurization installations for stack as well as all exhaust gases are being constructed. The boiler generates steam (1710 tons/hr) at a pressure of 255 kg/sq cm G and a temperature of 543-541 C. Heavy oil, crude oil, and naphtha can be burned as mixtures, or by themselves. The turbine generates 500 MW, has a steam pressure of 246 kg/sq cm G, and steam temperature of 538 C. The generator has a capacity of 560,000 KVA (hydrogen pressure, 3 kg/sq cm G), potential of 22,000 V, and short circuit ratio of 0.58.

52823 **APTIC NO. 76786**

Sugimoto, T., K. Hosoi, H. Ogata, Y. Jo, and E. Kin

STUDIES OF INFLUENCE TO THE EXHAUST COMPOSITION CAUSED BY MIXTURE RATIO S DISPERSION FOR EACH CYLINDER IN AUTOMOBILE GASOLINE ENGINE. *(Jidoshayo gasorin kikan no kito goto no kongohi no baratsuki ga haiki sosei ni oyobosu eikyo). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, p. 5-8, 1975. (Presented at the Japan Society of Mechanical Engineers, Lecture Meeting, Tokyo, Japan, April 1-3, 1975.)*

A gasoline engine with 4 series cylinders, a maximum output of 105 ps/6000 rpm was used for this study. The main jet of the carburetor was replaced with a needle valve for convertible air-fuel ratio. Exhaust gas was sampled at 30 mm, 200 mm, and 1500 mm from the exhaust valves for the calculation of air-fuel ratio, the exhaust composition analysis for each cylinder, and the analysis for total exhaust, respectively. Air-fuel dispersion at acceleration was greater than that at constant operation. The measured total nitric oxide concentration and NO concentration in the exhaust from cylinder 1 were in good agreement with calculated values obtained by using a previously derived equation. The exhaust compositions were greatly affected by the air-fuel dispersion.

52824 **APTIC NO. 77424**

Sugiura, Kimiaki

ENVIRONMENTAL POLLUTION BY AUTOMOBILES, II. ANALYSIS OF HEAVY METALS IN TIRES AND SOILS ALONG THE ROADS. *(Jidosha ni yoru kankyo osen sono 2. Taiya to shado waki dojo-chu no jukinzoku bunseki). Text in Japanese. Preprint, the Society for General Research on Environmental Science, Tokyo (Japan), p. 140-141, 1975. (Presented at the Preparatory Meeting of the Society for General Research on Environmental Science, Lecture Meeting, 1st, Tokyo, Japan, June 6-8, 1975.)*

Soil samples were collected in the neighborhood of Koshu Road, Fuji Subaru Line, Kawagoe Road, National Road No. 16, and Prefectural Road Kawagoe-Sakato-Keroyama. Several sites were selected at specified distances from the road on a line perpendicular to the road, and samples were collected. The soil samples were dried and analyzed by atomic absorption spectroscopy. The zinc content was very high, as high as 2000 ppm at a point 10 m from Kawagoe Road at Sunashinden 129, Kawagoe City. The content decreased with increasing distance from the road, and was 1100 ppm at a point about 50 m from the road. The cadmium content was 2 ppm at a point 10 m from the road, and was 1.2 ppm at 50 m from the road. The lead content varied between 170 and 40 ppm. The same tendency was observed at a point on National Road No. 16 in Shinsayama City. Tires made by the Yokohama Rubber Co., the Toyo Rubber Co., the Dunlop Co., and the Bridgestone Co. were crushed, burned, and the the ash was dissolved with concentrated nitric acid and concentrated perchloric acid. The heavy metal content was then determined by atomic absorption spectroscopy. The Cd content of the tire treads was 4.07-37.60 ppm. The zinc content was 7300-13,000 ppm. Pollution of roadside soils by zinc, lead, and cadmium is attributable to automobile tires.

52825 **APTIC NO. 76849**

Trayser, David A., Ellsworth R. Blosser, Fredrick A. Creswick, and William R. Pierson

SULFURIC ACID AND NITRATE EMISSIONS FROM OXIDATION CATALYSTS. *Preprint, Society of Automotive Engineers, Warrendale, Pa., 15p., 1975. 25 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress and Exposition, Detroit, Mich., Feb. 24-28, 1975, Paper 750091.)*

The emission of sulfuric acid and nitrates from a 1973 Ford (351 cu in. V-8 engine) equipped with an oxidation catalyst was investigated. Tests were performed on unleaded fuel at 60 mph road-load conditions, using monolithic noble metal catalysts and no catalyst, and at 60 and 30 mph road-load conditions using a pellet-bed noble metal catalyst. Nearly all of the fuel sulfur was emitted as sulfur dioxide in the absence of the catalyst (less than 1% as sulfate). About 43% of the fuel sulfur was emitted as sulfate when the catalyst was used at 60 mph (monolith or pellet), and 86% at 30 mph (pellet catalyst). Catalyst-produced particulate emissions were composed almost entirely of sulfuric acid and associated water. About 95% of the H2SO4 mass (with catalyst) was composed of droplets less than 0.3 micron in aerodynamic diameter. The amount of nitrate present in the engine exhaust was very low (less than 300 micrograms/mi) and was not perceptibly enhanced by the presence of the catalyst. (Author abstract modified)

52826 **APTIC NO. 77564**

Volz, F. E.

BURDEN OF VOLCANIC DUST AND NUCLEAR DEBRIS AFTER INJECTION INTO THE STRATOSPHERE AT 40-58 DEGREES N. *J. Geophys. Res., 80(18):2649-2652, June 20, 1975. 18 refs.*

Volcanic dust and nuclear debris burdens in the stratosphere are analyzed. Meridional profiles of turbidity after the explosion of the Katmai volcano in June 1912 at 58 deg north are compared with debris burdens from Chinese nuclear tests. Turbidity and burden generally peak strongly in arctic latitudes. Only two tests show indications of a bulge at 30-45 deg north which probably existed for Katmai dust in the spring of 1913. The residence time of Katmai dust appears to have been about 1 yr, whereas fallout of nuclear debris does not appear to have started before the winter following the tests. The results presented on turbidity and debris burden are compared with estimates of pollutants produced by supersonic transport aircraft since the latitude range of the heaviest traffic is 40-55 deg north. Models indicate increased pollutant concentrations of 70% in the heaviest traffic zone and 50% in the polar region. However, the results of the turbidity and debris analyses relate to generally lower altitudes than those of SST flights. (Author abstract modified)

52827 **APTIC NO. 76784**

Waguri, Y., T. Hamatake, S. Ono, and K. Nakajima

STUDIES OF THE INFLUENCE OF OXYGEN CONCENTRATION IN EXHAUSTED GAS AND BEARING SURFACE TEMPERATURE ON THE EXHAUST VALVE BEARING SURFACE ABRASION IN DIESEL ENGINE. *(Dizeru kikan no hakiben zamen no sonmo ni oyobosu haiki gasu sonso nodo to zamen ondo no eikyo). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, p. 47-50, 1975. (Presented at the Japan Society of Mechanical Engineers, Lecture Meeting, Tokyo, Japan, April 1-3, 1975.)*

A 4-cycle, 6-cylinder 4300 cc diesel engine of precombustion type was used for a study of the effects of oxygen concentration and bearing surface temperature on the abrasion of the exhaust valve bearing. Lighht oil containing 0.68% sulfur and having a firing point of 92 deg was used as fuel. Exhaust temperature was varied by adjusting the temperature of air supplied to the no. 6 cylinder at a constant air ratio, or the air ratio was varied at constant exhaust and valve bearing temperatures. Exhaust gas from the no. 6 cylinder was sampled at 50 mm from the exhaust exit. The abrasion decreased with increasing air ratio. At constant bearing surface temperature, the abrasion increased with increasing oxygen concentration in the exhaust. The effect of bearing surface temperature on the abrasion was more significant than the effect of oxygen concentration. The abrasion also increased with increasing engine rotation number.

52828 **APTIC NO. 77557**

Widman, Gary L.

ENVIRONMENTAL IMPACT STATEMENTS. LIST OF STATEMENTS RECEIVED. *Federal Register, 40(115):25249-25251, June 13, 1975.*

A list of environmental impact statements received by the Council on Environmental Quality from various other Federal agencies is provided along with a brief description of each. The statements concern such areas as land use, refuse dumping in landfills, highway construction and projected increases in air pollution, and limitations on radiation doses to the general public attributable to planned releases from nuclear plants generating electrical power.

52829 **APTIC NO. 76821**

Yamada, Kenji

PRIVATE ENTERPRISES TREND IN POLLUTION ABATEMENT TECHNIQUE. *(Kogai kisei o sakidori suru minkan kigyo no aidea to doko). Text in Japanese. Sangyo to Kankyo (Ind. Enviro.), vol. 1975: 75, June 1975.*

A few examples are given of private enterprises which control their pollution to levels well below the governmental standards. Although most enterprises are trying to achieve the emission levels required by the scheduled governmental environmental standards, some of enterprises are looking well beyond the expected environmental standards. The intention of the latter enterprises is to gain good relations with the inhabitants near the enterprises, especially since pollution enforcements is always on the side of the inhabitants rather than that of the enterprises. Gaining such good relations with inhabitants was accomplished by distributing hot water produced in the company s processes to the population, or by achieving a surprising low pollution level. Several enterprises have equipment to reduce pollution levels to lower levels than are required according to the environmental standards and they await the tighter future standards which will enable them to sell this equipment quickly.

52830 **APTIC NO. 76777**

Kyoto City Inst. of Public Health (Japan)

INVESTIGATION REPORTS FOR THE CALCULATION OF NITROGEN OXIDES EMISSION COEFFICIENT FROM STATIONARY SOURCE (MELTING FURNACE, HEATING FURNACE AND KILN). *(Kotei hasseigen (yokairo, kanetsuro, shoseiro) kara no chiso sankabutsu haishutsu keisu sanshutsu chose kekka). Text in Japanese. 12p., June 1975. 4 refs.*

The emission coefficient of nitrogen oxides from melting furnaces, heating furnaces and kilns in Kyoto were calculated by measuring temperature, flow rate and moisture content of exhaust gas, NOx concentration, combustion gas composition, and flame and furnace temperatures. The calculation methods for the emission coefficent of nitrogen dioxide (kg NO2) per unit quantity of fuel consumed (solid:ton, liquid:kl, gas:1000 N cu m), calorific value (higher calorific value 10,000,000 kcal), amount of raw material charged(ton), and time (hr), are described. The factors affecting the NO2 emission are type of fuel, furnace structure, capacity, burner structure, air ratio, calorific capacity of combustion chamber, flame pattern, and temperature. The emission quantity of exhaust gas in Kyoto was 1-5 times 1000 N cu m/hr, which was less than 1/10 of those of other major cities. The emission coefficients obtained were 0.019- 8.66 kg NO2/hr, 0.664-3.00 kg NO2/ton, 0.071 kg NO2/1000 N cu m, 1.70-28.4 kg NO2/kl, 0.123-31.5 kg NO2/10,000,000 kcal, and 0.014-9.33 kg NO2/ton of raw material charged.

52831 **APTIC NO. 76842**

EXHAUST GAS LEVEL LIST OF THE AUTOMOBILE FITTED FOR 1975 AUTO EXHAUST GAS STANDARDS. *(Sudeni shitei to natta 50 nendo kisei tekigosha jidosha haishutsu gasu reberu risuto ichiran hyo). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(8):940-943, Aug. 1975.*

Numerical data for nitrogen oxides, hydrocarbons, and carbon monoxide automobile emission levels of 25 models by 5 automakers are summarized. These include 10 models by Toyo Kogyo, 1 model by Honda, 2 models by Mitsubishi, 6 models by Toyota, and 4 models by Nissan. These automobiles are all equipped with emission control devices to meet the 1975 emission standards. The average emission standards are 1.20 g/km nitrogen oxides, 0.25 g/km hydrocarbons, and 2.10 g/km carbon monoxide in the ten mode operation.

52832 **APTIC NO. 77522**

Tochigi Research Inst. for Environmental Pollution (Japan), Dept. of Air Quality and Noise

FLUE GAS INVESTIGATION. *(Endo haishutsu gasu no chosa ni tsuite). Text in Japanese. Tochigi-ken Kogai Kenkyusho Nenpo (Annu. Rep. Tochigi Prefect. Res. Inst. Environ. Pollut.), no. 1:91, Jan. 1975.*

The flue gas pollution by 109 facilities at 100 factories were investigated and three years of measurement results from 1971 through 1973 summarized for the flue gas emission rate, amount of soot, sulfur oxides, fluoride, chloride, hydrogen chloride, and nitrogen oxides pollutions. The facilities included were 36 boilers, 3 heating furnaces, 20 dissolution furnaces, 16 driers, 26 sintering furnaces, and 8 others. Of the facilities investigated 35.8% (29 facilities) violated the air pollution standards either on the amount of soot or SOx. In the facilities for driers, only one was within the standards and 15 were in violation. Of 36 boilers, 5 boilers exceeded the standards and 31 boilers were within the standards.

52833 **APTIC NO. 77576**

Hydrogen Energy Utilization and Development Combustion Technology Committee (Japan)

STUDY ON HYDROGEN COMBUSTION TECHNOLOGY. *(Suiso nensho gijutsu ni kansuru kenkyu). Text in Japanese. Nihon Gasu Kyokaishi (J. Japan Gas Assoc.), 28(5):2-11, May 1975.*

The Hydrogen Energy Utilization and Development Combustion Technology Committee consisting of 14 representatives of public organs, manufacturers of special equipment, and the gas industry was established to research the merits of hydrogen as a fuel, its position in the consumption of energy and the time required for it to become a practical fuel. Since the combustion of hydrogen is too active, traditional burners cannot be used. However, based on an entirely new concept, new equipment may be developed. Regarding safety, these are not insurmountable problems, if adequate precautions are taken. The merits of hydrogen fuel include: future availability, adaptability to great circulation, easier storage and transportation than electricity, and low pollution. Demerits include its present expense, a lack of supply means, the question of safety, and nitrogen oxide generation. Very little literature on the industrial use of hydrogen as fuel exists. The use of a special burner exclusively for burning hydrogen is recommended. Special care must be taken in handling the air register. In supplying the fuel, gas leakage must be prevented; also it is necessary to prevent the mixing of lubricating oil and the gas and inadvertent ignition. For automatic control, sequence control by air or oil pressure is desirable from a safety point; if an electric type must be adopted, precautions against explosion must be adopted. For home use, backfire is feared. For cooking, an entirely new type of burner may have to be developed. The hydrogen flame is not very visible to the eye, and special safety standards for hydrogen gas must be established.

52834 **APTIC NO. 77602**

THE INCINERATOR LANGNAU I. E. *(Kehrichtverbrennungsanlage Langnau i. E.). Text in German. Umweltschutz Staedtereinig. (Vienna), 12(7):184-185, 1975.*

The incinerator in Langnau, Switzerland, which serves a population of 50,000, comprises a trash feeder, a combustion chamber, an ash tap-off, a flue gas cleaning system, and electric controll equipment. The trash storage bunker was designed for a volume of 550 cu m. The feeder consists of a funnel and a crushing mechanism for bulky waste. Slaughterhouse wastes are hung in the incinerator in a cage whose bottom is a grate. The cage is removed following incineration. Trash charged through the funnel proceeds to the stepped grate where it is dried. The flue gases from incineration go to an afterburning chamber where the ash components separate and pass to a cyclone. After cooling and further trash separation in the cyclone, the gas proceeds to a chamber one-fifth full of water, then to a venturi scrubber. The cleaned gas is ventilated before leaving the stack.

1974

52835 **APTIC NO. 77595**

Himi, Y.

AIR POLLUTION PROBLEMS. *(Taiki osen mondai ni tsuite). Text in Japanese. Jitsumu Hyomen Gijutsu. (Pract. Surf. Technol.), no. 250:33-40, Nov. 1974.*

General problems regarding air pollution are reviewed. The main sources of pollution, the meaning of the pollution emission coefficient, secondary effects of pollutants (e.g., photochemical reactions), and counterplans for pollution control are discussed with regard to energy sources and industrial activities. The need for strict legal standards and the technical methods of pollution control is emphasized.

52836 **APTIC NO. 77376**

Komatsu, Gen-ichi

STUDIES ON COMBUSTION PROCESS IN A SMALL 2-CYCLE GASOLINE ENGINE. *Himeji Kogyo Daigaku Kenkyu Hokoku (Rep. Himeji Inst. Technol.), no. 27-A:91-98, Oct. 1974. 7 refs.*

Exhaust gas from a 2-cycle gasoline engine was sampled with a high speed electromagnetic valve to investigate the relationship between certain engine operating variables and exhaust gas composition. The final carbon monoxide concentration during the engine expansion process decreased by approximately 1/2 the initial value when the air-fuel equivalence ratio was unity. Engine combustion with a relatively cool cylinder wall, especially below 120 C, resulted in a large quantity of unburned hydrocarbons depositing in the cylinder. Carbon monoxide, oxygen, and hydrogen emissions decreased at the end of the expansion stroke, while carbon dioxide emissions increased at this engine operating point. (Author conclusions modified)

52837 **APTIC NO. 77561**

Marciante, A., P. Chiampo, F. De Cristofaro and R. Gozzelino

B-2-2-FUEL HYDROCARBON COMPOSITION AND HIGH-SPEED KNOCK. *Preprint, Societe des Ingenieurs de l Automobile, Paris (France), p. 278-283, 1974. 7 refs. (Presented at the Congres International FISITA, 15th, Paris, France, May 13-17, 1974, Paper B-2-2.)*

The octane behavior of unleaded fuels, particularly high-speed knock, was studied. Four series of test fuels were considered, all of which had a Research Octane Number between 90 and 92, but were different with regard to hydrocarbon composition and Motor Octane Number. These fuels were tested on a commercial Fiat engine. The engine compression ratio was reduced to optimize the accuracy of the measures. The octane measures were obtained by counting the knock cycles and then calculating the knock percentages. It was possible to establish a relationship between the percentage and intensity of knock. The Engine Octane Numbers were related to the hydrocarbon composition (in particular aromatic and olefinic concentrations) and to the octane levels of the (Cylinder Fuel Research) CFR engine.

52838 **APTIC NO. 76798**

Mariotti, N. and A. W. Ramsden

THE RESPONSE OF CARS ON THE ROAD TO LEAD IN GASOLINE. *Preprint, Societe des Ingenieurs de l Automobile, Paris (France) p. 271-277, 1974. 8 refs. (Presented at the Congres International FISITA 15th, Paris, France, May 13-17, 1974, Paper B-2-1.)*

An experiment to evaluate the contribution of lead to the Road anti-knock performance of gasolines under constant high-speed driving conditions is described. Detailed studies were made in some typical European cars of the Road Octane ratings of a carefully designed set of test fuels varying independently in Research Octane Number (RON), sensitivity, lead content and hydrocarbon composition. Orthogonality of the test gasoline characteristics permitted positive identification of the effects of lead on Road Octane quality independent of its effects on RON and sensitivity. The effect of fuel composition was further investigated in a test bed engine using olefinic and aromatic gasoline components. It was found that lead made a pronounced positive contribution to the Road Octane performance of aromatic gasolines, but had a negligible effect in olefinic gasolines. However, RON and sensitivity remained the main controlling parameters.

52839 **APTIC NO. 77451**

Dept. of the Environment (England), Working Party on the Suppression of Odours from Offensive and Selected Other Trades

ODOURS: PART 1: ASSESSMENT OF THE PROBLEM IN GREAT BRITAIN. *166p., 1974.*

The nature, scope and magnitude of the odor nuisance problem and measures taken to deal with it are discussed. The malodorous gases and vapors described do not normally occur in toxic concentrations, so attention has been directed to the amenity aspect. Many activities produce unpleasant smells, including animal byproducts operations, in particular hot rendering of animal wastes and fishmeal manufacture; certain types of modern farming operations; the chemical, food processing, metallurgical processing, paint and varnish, and plastics industries; and refuse and sewage disposal. These were investigated with reference to odor sources and the relation between operating procedures and odor type and intensity. People's odor perception cannot be related to the concentration of any particular compounds. Furthermore, the very high sensitivity of the human nose to some compounds is difficult to match with present methods of analysis. Thus the use of human observer panels plays a dominant role. Methods of sampling and transport and presentation of samples to the observer are discussed with particular reference to dynamic dilution methods. Methods of odor abatement currently used are discussed. None is fully satisfactory from the technical and economic standpoint. Technical and design data are seriously lacking. Careful design of processing plant and equipment, good maintenance, and adequate scheduling of transport and storage can help considerably in the prevention and alleviation of odor problems. Proper design and good operation and maintenance of abatement plant are often neglected. Complete answers to many industrial odor problems do not exist at present. (Author abstract modified)

1973

52840 **APTIC NO. 76810**

Fujii, T., A. Muraguchi, and K. Nishiuchi

SURVEY REPORT ON POLLUTIONS AT FOUNDRIES. *(Chuzo kojo ni okeru kogai jittai chosa hokokusho). Text in Japanese. Shiga Kenritsu Kikai Kinzoku Kogyo Shidosho Gyomu Hokoku (Shiga Prefect. Mach. Met. Ind. Guid. Stn. Bus. Rept.), p. B1-B6, 1973.*

Questionnaires about pollution control were sent to 40 foundries in Shiga Prefecture, and 39 which replied were later visited. Almost all the enterprises were very mindful of pollution problems. Most were prepared to take responsibility for any problems, but they were not ready to install pollution control equipment due to the expense, unreliability, and low efficiency of such equipment. Most of the enterprises were waiting for others to install such equipment and, if the results were favorable, they were prepared to also install such equipment. In terms of heavy oil, all the foundry cupolas come under facilities which generate soot and smoke, well within the range of pollution control regulations. Nine of the enterprises have received complaints so far (three cases of air pollution, four cases of water pollution, one case of noise, one case of vibration, and three cases of odors). Six enterprises have installed dust prevention equipment, and six have appointed pollution prevention managers. Only seven enterprises tested the concentration of emissions.

52841 **APTIC NO. 77474**

Holl, William H.

VARIABLES FOR EMISSION TEST DATA ANLAYSIS. *Preprint, Society of Automotive Engineers, Inc., New York, 17p., 1973. 12 refs. (Presented at the Society of Automotive Engineers, Automobile Engineers Meeting, Detroit, Mich., May 14-18, 1973, Paper 730533.)*

A comprehensive Environmental Protection Agency emission test analysis program designed to determine the significance of variables in the analysis of vehicle emission test data is described, with particular reference to the consistent evaluation of catalytic converter performance. The analysis program includes real-time recording of emission concentrations and mass rates, catalytic converter efficiencies, and the air-fuel ratio. Mass accumulations are printed out during the test at the end of each test model. Test results and an analysis of repeatability are summarized on-site immediately following the test. Simplified mathematical relationships that were derived between exhaust gas concentrations and engine variables are illustrated.

52842 **APTIC NO. 77432**

Homma, S., H. Fukuda, T. Nakaya, R. Sato, H. Yahata, and H. Kano

ON THE POLLUTION BY HEAVY METALS AROUND KOSAKA-REFINERY OF DOWA MINING CO. (AKITA PREFECT.). *(Dowa kogyo Kosaka kogyosho(Akita- ken) shuhen no jukinzoku osen ni tsuite). Text in Japanese.*

Preprint, Society of Science of Soil and Manure, Japan, no. 19: 149, Sept. 1973. (Presented at the Society of Science of Soil and Manure, Lecture Meeting, 1973.)

To determine whether the source of heavy-metal pollution in paddy fields near the Kosaka refinery was exhaust from the refinery or sewage from the upstream mines, the soil around the refinery were analyzed for heavy metals. It was found that the soil within six km from the refinery was polluted, especially east and west of the refinery. The soil samples taken every 100 m in the paddy fields snowed that the degree of heavy metal pollution was heavier in the downstream area than in the upstream area, and that the degree of pollution in the paddy field was about the same as that in a nearby field. The vertical distribution of heavy metals in the soil of the paddy field was 30 cm from the surface. However, in the place where upsidedown treatment had been carried out, the maximal content of cadmium and zinc was found 50 cm from the surface, and that of copper and lead was found at 40 cm.

52843 **APTIC NO. 76894**

Sugimura, K.

SUMMARY OF THE CADMIUM POLLUTION SURVEY AT ARAO AREA. *(Arao chiku ni okeru kadomiumu osen chosa kekka no gaiyo). Text in Japanese. Kumamoto-ken Eisei Kogai Kenkyusho-Ho (Annu. Rep. Kumamoto Prefect. Inst. Public Health Pollut.), vol. 1973:145-146, Oct. 1973.*

The cause of cadmium pollution in Arao City, Kumamoto Prefecture, was considered. The rice produced in the area often contained cadmium levels more than 0.4 ppm. The Cd levels in airborne dusts, river water, soil, and rock in the area were analyzed. The airborne dusts were collected by a high volume air sampler, and the Cd analysis was made by atomic absorption spectrometry. No significantly high Cd was found in river water, soil, or rocks. However, considerably high Cd was found in the airborne dusts and the Cd in dusts collected during winter was ten times higher than that collected in summer. There was a possible Cd emission source 7 km from the area. The study suggested that the areal cadmium pollution could be caused by the airborne dusts.

1964

52844 **APTIC NO. 77468**

Nabors, W. M., D. C. Strimbeck, R. W. Cargill, and J. Smith

BUREAU OF MINES PROGRESS IN DEVELOPING THE COAL-BURNING GAS TURBINE POWER PLANT. *Preprint, Inst. of Electrical and Electronics Engineers, New York and American Society of Mechanical Engineers, New York, 8p., 1964. 20 refs. (Presented at the IEEE-ASME Institute of Electrical and Electronics Engineers- American Society of Mechanical Engineers) National Power Conference, Tulsa, Okla., Sept. 27-Oct. 1, 1964, Paper 64.)*

The development and testing of a gas turbine drive by hot gases from burning coal is described. The turbine is being developed for use in large central-station power plants. An analysis of the ash in the exhaust stack reveals that 94% of the particles are smaller than 10 micron. Since only 80% of the particles entering the turbine are smaller than 10 micron, passage through the turbine obviously degrades the particles. The exhaust composition comprises 3.5% sulfur, 0.3% hydrogen, 24.5% total carbon, 0.2% nitrogen, 7.8% oxygen, 3.4% moisture, and 60.3% ash. The major operational problem with the turbine is ash deposition on the blades, especially the first-stage stator blades. Means for preventing or controlling ash deposition are being sought during a separate series of test runs.

CONTROL METHODS

1975

52845 **APTIC NO. 76807**

Ando, Toru, Hideaki Tanabe, Yoshindo Higashi, and Kiyoshi Ikegami

STUDIES ON THE CLEANING OF DISCHARGED GASES BY THE ADDITION OF HYDROGEN TO LPG ENGINES. *(LPG kikan no suiso tenka niyoru haiki gas joka ni kansuru kenkyu). Text in Japanese. Preprint, Japan Society of Automotive Engineers, Tokyo, p. 113-121, 1975. 5 refs. (Presented at the Japan Society of Automotive Engineers Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

Studies on the reduction of nitrogen oxides discharged from gasoline engines were made. The addition of hydrogen, which has a very wide combustion range, to the fuel was investigated as a means for decreasing the NOx discharge when the combustion occurs in a very dilute fuel-air mixture. Liquid petroleum gas was used in place of gasoline to increase the miscibility. The maximum combustion pressure was lowered accompanied by irregular combustion, as the fuel concentration became more dilute. The maximum combustion temperature was also lowered. Advancing the time of ignition resulted in a rise of the maximum combustion temperature and an elongation of the duration of high temperature. An increase in the load resulted in an increase in the maximum pressure and the maximum combustion temperature. The addition of hydrogen increased the maximum combustion temperature and the maximum combustion pressure as the rate of ignition increased. The ignition took place rapidly and the combustion quickly came to an end. In the operation of the engine on dilute fuel gas, the exhaust hydrocarbons remarkably decreased.

52846 **APTIC NO. 77533**

Asano, Taku

DISCHARGED GAS CONTROLLER OF 2-STROKE GASOLINE ENGINES FOR AUTOMOBILES. *(Jidosha yo 2 saikuru gasorin kikan no haiki seigyo sochi). Text in Japanese. (Daihatsu Kogyo Co., Ltd., Osaka (Japan)) Japan. Model. Util. Sho 50-15058. 2p., May 12, 1975. (Appl. Oct. 26, 1970, 1 claim).*

In this invention a controller valve is installed on the downstream side of a muffler, namely, between the muffler and the exit of discharged gas. This valve is so installed that it opens when the accelerating pedal of the engine is operated and that it almost closes when the accelerating pedal is released, leaving a narrow opening. The narrow opening is left when part of the control valve is cut off by a suitable width. By the installation of the valve described above, the gas discharge during idling is reduced and the braking action of the engine is increased. Generally, 2-stroke engines show a large fluctuation of gas pressure in the exhaust tubes. The suppression of this fluctuation is fatal to the normal operation of the engine. However, in the present invention, the valve is installed in the downstream side of the muffler, where the fluctuation of the gas pressure is small. Therefore, the presence of the valve does not interfere with the operation of the engine but is effective to decrease the noise of the gas discharge.

52847 **APTIC NO. 76808**

Atsukawa, Masumi

PROBLEMS IN THE DESULFURIZATION BY THE WET LIMESTONE-GYPSUM PROCESS. *(Shisshiki sekkai sekko-ho datsuryu purosesu no mondaiten). Text in Japanese. Preprint, Japan Management Assoc., Tokyo, p. 53-69, 1975. (Presented at the Japan Management Association Symposium on Pollution Engineering, Tokyo, Japan, March 17, 1975.)*

Desulfurization of smoke is now successfully adopted in the Japanese power industry. By the end of 1978, 49 plants corresponding to 10.6 million kw will begin operation. The limestone-gypsum method is predominant and is especially studied in desulfurization at larger plants. The particular situation of Japan also favors the practice of this method; natural gypsum production is very poor, but limestone is abundant in Japan. The demand for gypsum is very strong. Estimated demand for 1975 is 2.2 million tons for Portland cement production, 1.7 million tons for boards for structural use, 0.6 million tons for plaster and 0.1 million tons calcinated gypsum. In the United States the trend is also toward the adoption of the limestone-gypsum method. Main desulfurization plants in the United States are tabulated with important data.

52848 **APTIC NO. 77369**

Banks, Ridgeway

THE BANKS ENGINE. *Die Naturwissenschaften, 62(7):305-308, July 1975. 4 refs.*

A new type of heat engine utilizing macroscopic shape changes associated with a thermally-activated phase transformation in alloys of nickel and titanium is described. Engines capable of converting small temperature differences at near-ambient temperature to mechanical work are seen as a promising technology for the recovery of thermal energy currently going to waste. Depending on future economic feasibility, such engines may be practically applied to conversion of solar, geothermal, oceanic thermal gradient, or industrial thermal sources.

52849 **APTIC NO. 77379**

Blackwood, J. D. and D. J. McCarthy

AIR POLLUTION RESEARCH. CONVERSION OF SULPHUR DIOXIDE BY REACTION WITH CARBON. *PACE, 28(1 and 2):25-29, Jan.-Feb. 1975. 10 refs.*

The reaction of sulfur dioxide with charcoal was studied in a laboratory reactor to investigate the feasibility of the process for removing SO2 from stack gas. The main products consisted of sulfur and carbon disulfide, with some carbonyl sulfide also being formed. The initial reaction between charcoal and SO2 to give carbon dioxide and sulfur was first order, depending only on the concentration of SO2 and the temperature. The formation of COS appeared to be second order, and the formation of CS2 also appeared to be second order with respect to COS. The formation of COS was hindered by the presence of SO2 and S. Thus the conversion of SO2 to either S or CS2 with the liberation of either CO2 or carbon monoxide was demonstrated.

52850 **APTIC NO. 77430**

Chiba, Toshio

EXAMPLES OF DUST CONTROL MEASURES. *(Funjin taisaku jitsurei shu). Text in Japanese. MOL, 13(7):44-50, July 1975.*

Dust control measures are described for various industrial conditions. Standards for industrial health are formulated for young males working at medium degree labor for 8 hr. Dust controls are based on type of dust. Type 1 dust emissions are restricted to 2 mg/cu m (dust containing more than 30% free silicic acid; talc; alabaster; aluminum; alumina; diatomaceous earth; sulfide ores; and asbestos). Type 2 dust emissions are restricted to 5 mg/cu m (mineral dust containing less than 30% free silicic acid; iron oxides; black lead; carbon black; activated carbon; and coal). Type 3 dust emissions are restricted to 10 mg/cu m (all other types of dust particles). Dust control measures in effect at a steel works plant are concerned with 3 phases of operation. To control dust, the belt conveyer system uses judicious water sprinkling during the conveying operation, and an enclosed hood system at the transfer point. Fine ore, earth and sand, which are stored outside, are sprinkled with water from mobile or stationary sources. Coagulants can be used to hold down dust, but costs can run as high as $0.03-$0.12/sq m. High temperature dust particles (from molten steel, sintered steel, coke at red heat) are collected by means of hoods and ducts, and utilization of natural upward draft induced by high temperatures. Faulty design of collection installations here can be avoided by calculations based on the actual conditions.

52851 **APTIC NO. 76833**

Christmann, G.

THE WET/DRY COOLING TOWER. CRITERIA FOR COMBINED WET/DRY COOLING TOWERS AND PRESENT STATE OF DEVELOPMENT. *(Der Nass-/Trockenkuehlturm. Kriterien fuer combinierte Nass-/Trockenkuehltuerme und derzeitiger Entwicklungsstand dieser Bauart). Text in German. VGB Kraftwerkstechnik, 55(4):218-225, April 1975. 11 refs.*

Fog formation caused by wet cooling towers can be reduced or avoided by changing the condition of the exiting air to avoid oversaturation when it mixes with the ambient air. An efficient and economical method to achieve this is the wet/dry cooling tower. Operation of a wet/dry cooling tower requires a determination of the criteria for for formation in winter. Preliminary calculations require such data as the dry bulb and wet bulb temperature of the ambient air, the maximum allowable cold water temperature of the wet/dry cooling operation, and the conditions of the exiting air. A fundamental meteorological study for the final design is recommended. Diagrams comparing the characteristics of a wet cooling operation with those of a wet/dry cooling operation show that in the latter case a higher cold water temperature and a lower evaporation loss is achieved. Other diagrams show the dependence of the cold water temperature and the evaporation loss on the position of the control flaps between the wet and dry sections.

52852 **APTIC NO. 77409**

Date, Tasuku, Shizuo Yagi, Kazuo Inoue, and Toru Hatanaka

THE DEVELOPMENT OF THE CVCC ENGINE AND THE EFFECT OF FUEL COMPOSITION ON EXHAUST EMISSIONS. *Preprint, World Petroleum Congress, 9p., 1975. 6 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

The Honda Compound Vortex Controlled Combustion (CVCC) stratified charge engine is described along with the effect of fuel composition on engine exhaust emissions. The engine operates at a very lean air-fuel ratio and thus achieves inherently low hydrocarbon and carbon monoxide emissions without the use of a catalytic converter. The effect of increasing the aromatic content of gasoline on the engine's hydrocarbon and carbon monoxide emissions is negligible; nitrogen oxide emissions tend to increase with increasing fuel aromatic content, though the increase is not serious. The engine is capable of meeting the 1975 American standards of 3.4 g/mi for CO, 0.4 g/mi for hydrocarbons, and 3.1 g/mi for NOx with fuels of various distillation characteristics.

52853 **APTIC NO. 77598**

Doi, Tsuguaki

ELECTRIC DUST COLLECTOR. *(Denki shujinki). Text in Japanese. (Mitsubishi Heavy Industrial Co., Ltd., Kobe (Japan)) Japan. Model Util. Sho 50-27979. 3p., Aug. 19, 1975. 2 refs. (Appl. March 29, 1969, claims not given).*

The electro-precipitator controlling the spark discharge at each electrode is described. A resistance insulator rod (or semiconductor) is used as the electrode supporting rod in conventional electro-precipitators. The voltage to the precipitator is applied to each electrode through the resistance insulator rod. Therefore, the voltage at individual electrodes can be independently dissipated at the resistant insulator rod. Since the dissipation of built-up voltage is controlled at each electrode, a decrease in the voltage at other electrodes was prevented, making effective dust collection possible.

52854 **APTIC NO. 77615**

Eishoji, Hiroshi

STACK GAS PURIFYING FACILITY OF AN INCINERATOR. *(Shokyaku-ro no haien seijyoka sochi). Text in Japanese. (Assignee not given.) Japan. Model Util. Sho 50-25575. 2p., July 31, 1975. (Appl. Nov. 20, 1971, claims not given).*

A cleaning device for exhaust gases from furnaces is described. The exhaust gas in chimneys enters into a taper duct which is attached perpendicularly to the top of the chimney. A fan is installed at one end of the taper duct, which forces the exhaust gas to enter the taper duct. The taper permits the installation of several filters and can be split in half to facilitate replacement of the filters. One impeller was installed between each of two filters to create a smooth flow of exhaust gas. The sludge, oil, organic, and inorganic components in the flue gas can be removed by a combination of filters in the taper duct. The fan and impellers assist the flow of exhaust gas through the cleaning apparatus, thereby eliminating obstruction by the filters.

52855 **APTIC NO. 77619**

Fischer, Friedrich di and Karl Heinz Pfefferie

AIR CLEANING TECHNOLOGY. *(Tecnologie della depurazione dell aria). Text in Italian. Inquinamento, 17(5):27-31, May 1975.*

Air pollution control technology is described for reducing operating costs and safeguarding the environment. Most of the solvents employed in modern industries can be recovered by adsorption on activated carbon. When for technical reasons this recovery becomes impossible or uneconomical, the air pollution problem can be solved by the destructive technology, using thermal or catalytical combustion. This system can also be combined with a preadsorption process to fix the pollution substances on activated C. The possibility of reusing the recovered heat reduces the operating costs.

52856 **APTIC NO. 77605**

Gall, R. L. and E. J. Piasecki

THE DOUBLE ALKALI WET SCRUBBING SYSTEM. *Chem. Eng. Progr., 71(5):72-76, May 1975.*

A double alkali wet scrubbing system for removing sulfur dioxide from flue gas has proved itself in a full-scale powerhouse burning high sulfur coal. The chemistry of the scrubbing process is described, including the process by which the caustic is regenerated. The two-step chemical process used to prevent scaling is described. An impingement type unit was used because of the need to remove both SO2 and particulates. Minor problems were experienced with scaling. A reactor clarifier is used to settle calcium sulfate and calcium sulfite sludge to be recycled. The system used to control caustic feed to the scrubber, chemical feed for caustic regeneration and softening, and sludge removal is described.

52857 **APTIC NO. 77475**

Gerstein, Steven M. and Mark E. Franza

CONTROL TECHNOLOGY FOR SECONDARY ALUMINUM SMELTERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 11 refs. (Ptesented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-66.6.)*

A dry absorption-filtration system for controlling particulate and gaseous (chlorine, hydrogen chloride, and hydrogen fluoride) emissions from a secondary aluminum smelter is described. The basic component of the system is a baghouse coated with a chromatographic material capable of absorbing acid gases in a gas-solid reaction. The chromatographic coating filters submicron materials prevents submicron particle permeation of the bag filter cloth. Bags are shaken every 3-5 days. Outlet particulate loadings for the system are less than 0.005 grains/standard cu ft, and the opacity of the plume is zero. The average acid gas emission is 10 ppm or less. The bag life is conservatively estimated at 10 yr. The annual operating cost, including amortization, for the system is about $2.00/ton of aluminum. (Author abstract modified)

52858 **APTIC NO. 77425**

Gloecker, Otto and Bernd Kraus

L-JETRONIC - AN ELECTRONIC FUEL INJECTION SYSTEM ON THE BASIS OF AIR FLOW MEASUREMENT. *(L-Jetronic - Elektronisches Benzineinspritzsystem mit Luftmengenmessung). Text in German. Motortech. Z. (Stuttgart), 36(9):242-248, 1975. 7 refs.*

The L-Jetronic is a fuel injection system using intermittent injection into the intake ports at a low fuel pressure level. The system features direct air flow measurement as the main input variable to determine the required quantity of fuel. Fuel metering is accomplished by electromagnetically operated injectors. At constant fuel pressure the amount of fuel injected is proportional to the injector opening time, which is calculated precisely and optimized for every engine condition by the electronic control unit dependent on the signals coming from various sensors. The air flow is measured by the air flow meter using a measuring plate which adjusts its angular position according to air flow. The position of the plate is converted into an electrical signal representing air flow per unit time by a potentiometer. Out of the air flow and engine speed information, the electronic control unit calculates the electric pulses that actuate the injectors. As these pulses determine the fuel flow on a per stroke basis, and the air flow meter indicates air flow per unit time only, a division by the engine speed is required. The relationship between air flow and the position of the measuring plate was chosen in a way to keep the percentage error constant over the full operating range. Due to the small size of the individual components, installation problems are minimized. The L-Jetronic is an important contribution to the reduction of harmful exhaust emissions. The addition of feedback control using a lambda-sensor in the exhaust is readily possible.

52859 **APTIC NO. 77572**

Hattori, H.

NOX SUPPRESSION COMBUSTION TECHNOLOGY. *(NOx no yokusei nensho gijutsu). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 1(1):2-10, Jan. 1975. 13 refs.*

The Japanese environmental standard of 0.02 ppm for nitrogen oxides is limited to large facilities only, though local governments are planning to extend its application to more facilities. It is quite possible that total volume control will be applicable to NOx in the future. Even at the present level, it is necessary to reduce emission of NOx by 1/3 to 1/10. Both denitrification of stack smoke and suppression of NOx generation are necessary to achieve this target. Some practical experiments on suppression of NOx were carried out. The use of methanol as a fuel appeared quite promising; NOx emission in waste gas was around 20 ppm, and boiler efficiency decreased only 1% or so compared with the the use of traditional fuel. Although hydrogen is considered to be clean energy, due to its high combustion temperature, it may generate a great deal of NOx. Nitrogen in fuel is the most difficult to control, as it is generated even at low temperature. Compared with thermal NOx, however, suppression of fuel NOx using two-stage combustion may be possible to a certain degree. Low-oxygen combustion has already been adopted by power companies. The suppression of NOx generation requires a short combustion time and removal of reaction heat as quickly as possible. By attaching ring-shaped water-cooling devices to the high temperature burner tile of a vortex burner, uncooled NOx generated by burning kerosene was lowered from 320 ppm to 60 ppm. Burner structure may be changed to reduce thermal NOx also.

52860 **APTIC NO. 77441**

Hellwig, Alfred and Reinhard Hiller

ASPECTS FOR AIR HYGIENE AND THE USE OF NATURAL GAS IN THE DISTRICT OF MAGDEBURG. *(Lufthygienische Aspekte beim Erdagaseinsatz im Bezirk Magdeburg). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. 10:102-120, 1975.*

The use of natural gas has become a decisive factor in the improvement of air hygiene conditions in the district of Magdeburg. The result has been a significant reduction of the dust and sulfur dioxide emissions during the last three years. However, owing to the utilization of this energy source, new criteria had to be established for the determination of stack heights. As the calculations could not be performed on the basis of SO2 emissions, nitric oxides were selected as reference values, whose content in the waste gas was unknown. The emission concentration of the nitric oxides emitted from several plants fired with natural gas were determined. Values were between 20 mg/cu m (N) and 140 mg/cu m (N) depending on the size of the boiler.

52861 **APTIC NO. 77443**

Hockun, Fritz

DESIGN, CONTENTS, AND FORMAT OF THE EQUIPMENT AND CALCULATION CATALOGUE OF AIR TECHNOLOGY AND CRYOGENICS, PARTICULARLY DUST REMOVAL TECHNOLOGY. *(Aufbau, Inhalt und Form der Ausruestungs- und Berechnungskataloge der Luft- und Kaeltetechnik, speziell der Entstaubungstechnik). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. 10:59-70, 1975.*

Proceeding from an analysis of the designing process and the existing design data, the requirements for data design catalogues are outlined. These include the contents, the arrangement (including the shaping of the catalogue pages), the means of order, and the up-dating of the design catalogue. After completion, the equipment catalogue of de-dusting engineering will provide full information about de-dusting appliances, including complementary devices being manufactured in the German Democratic Republic. The calculation catalogue of de-dusting engineering includes the fundamental fields, burdens on the user, installation of plants, operation instructions, and material data. The purpose of the factory complex for air and refrigeration engineering, including a description of design data of all functional units and plants being manufactured in the field of refrigeration engineering, is described with special emphasis on dedusting engineering.

52862 **APTIC NO. 76779**

Honda, Soichiro

AN AIR INTAKE PASSAGE FOR THE RECOMBUSTION OF EXHAUST FROM MULTIPLE CYLINDER ENGINE. *(Takito enjin no haiki sai nensho yo kuki no donyu tsuro). Text in Japanese. (Honda Motor Co., Ltd. Japan)) Japan. Model Util. Sho 50-12570. 2p., April 18, 1975. 2 refs. (Appl. Aug. 22, 1968, 1 claim).*

This invention relates to the recombustion of carbon monoxide and hydrocarbon in engine exhaust gas by introducing air to the exhaust port. An exhaust valve and an exhaust port right after it are equipped to the cylinder with multi-combustion chambers to to the cylinder head. Slots are made between the cylinders and the cylinder head by casting, and an air passage is formed between the exhaust port and the cylinders. The entrance of the passage is connected to a blower. The device reduces the CO and HC concentrations in the exhaust as well as the production cost.

52863 **APTIC NO. 77525**

Hosoi, Kenzo, Takayoshi Sugimoto, Shakko Jo, Hiromi Ogata, and Eikichi Kin

THE MEASUREMENT OF THE AIR-FUEL RATIO BY THE ANALYSIS OF EXHAUST GAS. *(Haiki gas bunseki ni yoru kunen-hi no sokutei). Text in Japanese. Preprint, Japan Society of Automotive Engineers, Tokyo, p. 35-38, 1975. 5 refs. (Presented at the Japan Society of Automotive Engineers, Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

Studies on the determination of the air-fuel ratio in the transient state were made. The engine was 1770 cc in capacity with an 8.5 compression ratio. A needle valve was installed on the main jet of the carburetor to obtain any desired air-fuel ratio. Operation was under various conditions. The discharged gas was collected at a point 1.5 m from the discharge gas port. The collecting tube was kept at about 140 C to prevent the condensation of hydrocarbons. Carbon monoxide and dioxide, hydrocarbons, nitric oxide, and oxygen were analyzed. Studies of the effects on the air-fuel ratio of the hydrogen/carbon ratio, the average composition of hydrocarbons in the exhaust gas, the rate constant of the water gas reaction, and errors in the measurement of the exhaust gas composition were made. The air-fuel ratio determined from the composition of the exhaust gas was larger than that obtained at the inlet of the engine by about 1.2%. This was attributed to leakage of engine oil in to the cylinders.

52864 **APTIC NO. 76877**

Inada, T., I. Matsunaga, and K. Nagai

ON THE REMOVAL PROCESS OF NITROGEN OXIDES. *(Chisso sankabutsu jokyo process ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(8):915-922, Aug. 1975.*

A KNB process for nitrogen oxide removal was developed. The process consists of an oxidation tower, a mist removing tower, first alkalki tower, second alkali tower and a waste liquid treatment tower. The process has a wide range of treatment capacity between 50 cu m/h and 10,000 cu m/h. Nitric oxide was oxidized at the oxidation tower and the NO/NO2 ratio was reduced to approximately 1.0. Nitric acid mists were removed at the mist removing tower. Nitrogen oxides concentration in the resulting gas was reduced from 1000 ppm to about 400 ppm at the first alkali tower by using sodium hydroxide solution. The concentration was further reduced to below 100 ppm at the second alkali tower by using sodium sulfide or sodium sulfite. Flue gas containing 10,000 ppm NOx was treated by the same process and the NOx concentration was reduced to about 200 ppm.

52865 **APTIC NO. 77519**

Jacobs, Joern

EXPERIMENT WITH AN EXPERIMENTAL FURNACE FOR INCINERATION OF WASTE DUST. *(Erfahrungen mit einer Versuchsofenanlage zur Verbrennung von Abfallstaub). Text in German. Staub, Reinhaltung Luft, 35(9):334-336, Sept. 1975.*

The waste dusts containing synthetic resins from the furniture industry could not be burned in conventional furnaces meeting all environmental emission standards. By using an air-cooled cyclone furnace with appropriate flow conduction, a means could be found to overcome the problem of burning troublesome dusts in small volumes.

52866 **APTIC NO. 77587**

Kamimo, Yasumi, Kenji Yasuda, and Shigenori Onizuka

MANUFACTURING METHOD OF ACTIVATED CARBON FOR DESULFURIZATION. *(Datsuryuyo kasseitan no seizoho). Text in Japanese. (Hitachi Shipbuilding and Engineering Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 50-21434. 2p., July 23, 1975. (Appl. Nov. 27, 1971, 1 claim).*

A preparatory method of melanin-impregnated activated carbon to increase the carbon capacity for sulfur dioxide adsorption is described. The impregnation of nitrogen compounds by an absorption carbon increases the absorption capacity of activated carbon for SO2. A carbon was soaked in a melanin solution, which was dried at 100 C and then roasted at 750 to

950 C. If the final roasting temperature was kept at 850 C for 10 min, the increase of the carbon capacity was not affected by the order of the preparation. Air must be excluded during the preparation in order to prevent the loss of carbon. A 20 to 40% nitrogen component in the added melanin could be retained on the carbon after roasting. The absorption capacity increased 1.2 to 1.8 times upon melanin impregnation from the absorption capacity of the untreated carbon.

52867 APTIC NO. 77594

Kasuga, Susumu

STACK GAS DESULFURIZATION EQUIPMENT. *(Haigasu datsuryu sochi). Text in Japanese. (Mitaka Industry Co., Ltd., Musashino-shi, (Japan)) Japan. Model Util. Sho 50-10449. 2p., April 2, 1975. 1 ref. (Appl. Sept. 13, 1969, 1 claim).*

A device developed for use in small-scale factories which emit sulfur oxides is described. It can be installed in the path of stack gases, and consists of a large room which is divided int multi-layer shelves which house screen boxes. Each screen box is filled with absorbents such as activated charcoal, metal wool, or metal oxide particles. On the outer wall of the room, windows are cut to replace from each box absorbents which have been saturated. The absorbent boxes can be replaced during the operation of the factory. This system is effective for small factories because of its simple construction, high efficiency, easy handling, and low running cost.

52868 APTIC NO. 77523

Katayama, Takemi

EVAPORATOR. *(Kikaki). Text in Japanese. (Aisan Kogyo Co., Ltd., Osaka (Japan)) Japan. Model Util. Sho 50-14034. 3p., April 30, 1975. 1 ref. (Appl. July 5, 1971, 1 claim).*

An invention related to the improvement of evaporators for automobile engines is described. The state of evaporators at low speed operation of engines is improved especially by improving the state of fuel-fog formation. In this way, the fuel consumption is decreased and the content of carbon monoxide in the discharged gas is also decreased. In an evaporator having a slow port and an idle port, and air breed jet is installed in such a way that its opening confronts the slow port. An air breed jet is also made just in front of the idle port in such a way that the air is mixed with the fuel fog just before the opening of each port. The air breed jets are connected in a single path to an air inlet. In conventional methods, fuel flows slowly along the walls of the fuel path that leads to the slow port or idle port. The air flows in the central part of the fuel path. Therefore, the fog formation is not satisfactory and the distribution of mixed gas is not suited for combustion in the engine cylinders. According to the apparatus of the present invention, air is mixed with the fuel gas just before the port. Therefore, the fuel does not become separated from the air.

52869 APTIC NO. 76813

Kawaguchi, Osamu, Kiyoshi Minami, Naoshizu Fukui, and Go Sato

STUDIES ON THE CONTINUOUS BURNER EQUIPPED WITH A TWO FLUID REFLUX TYPE SPIRAL INJECTION VALVE. *(2-Ryutai kanryu shiki uzumaki funshaben o mochiita renzokushiki nenshoki no kenkyu). Text in Japanese. Preprint, Japan Society of Automotive Engineers, Tokyo, p. 91-100, 1975. (Presented at the Japan Society of Automotive Engineers Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

A continuous burner equipped with a two fluid reflux spiral injection valve was studied. Efforts were made to assure sufficient pulverizing of fuel over a wide range of the flow rate under relatively low fuel pressure and air pressure. Adjustment of the spraying angle was also attempted. The air used for pulverizing the fuel was also used to promote mixing in the combustion chamber. Satisfactory pulverizing was assured when the fuel pressure was 2-3 kg/sq cm and the air pressure was about 2 kg/sq cm. The distribution of air to primary, secondary, and tertiary injection was 14:22:64 or 6:26:68. The intensity of revolution was 3.0, 1.5, or 0.6. The state of flow in the burner was studied with a burner equipped with a partly transparent wall. At the same air-fuel ratio, the shape of the flame varied depending upon the distribution of air and the intensity of revolution. The length of the flame increased as the amount of the primary air decreased. At the same air distribution, the emission of nitrogen oxides increased with an increase in the air-fuel ratio. On the other hand, carbon monoxide emission decreased with an increase in the ratio.

52870 APTIC NO. 77406

Kubo, Jun-ichi, Yutaka Oguchi, and Hirotsugu Nomura

A NEW RESIDUAL DESULFURIZATION PROCESS. *Bull. Japan Petrol. Inst., 17(1):100-107, 1975. 6 refs.*

A residual hydrodesulfurization process that uses a fluidized catalyst is described. Oil and hydrogen-containing gas are introduced into the bottom of a double-tube reactor. The catalyst is fluidized by the oil and gas in an inner tube of the reactor and moves upwardly. At the upper end of the inner tube, the linear velocity of the oil decreases suddenly, and the catalyst settles into the outer space of the reactor. The catalyst accumulates in the outer space and moves downwardly, eventually resulting in a steady state condition where the upward movement of the catalyst is balanced by its downward movement. The reactor design permits withdrawal and replacement of the deactivated catalyst during the operation of the process. Catalyst entrainment is also prevented. The hydrodesulfurization process is capable of reducing the sulfur content of Khafji residue from 3.83 to 1.00% and that of Arabian light residue from 2.88 to 0.64%.

52871 APTIC NO. 77877

Kurney, I. W.

COMPOSTING PLANT FOR REFUSE-SEWAGE SET UP IN THE DISTRICT OF GROSS-GERAU. *(Muell-Klaerschlamm-Kompostierungsanlage fuer den Kreis Gross-Gerau). Text in German. Aufbereitungs-Technik, 16(5):219-225, 1975. 2 refs.*

A new composting plant for refuse and sewage is described. The refuse delivered to the plant is processed by impact mills, magnetic facilities, hammer mills and cylindrical screens. It uses the vacuum-pressure impulse method for biological treatment of the refuse-sewage mixture. The two large rotting plates, 50 m by 100 m, have ventilation grooves which divide the plates into sections. The grooves are connected to the vacuum pressure impulse system. Compost filters, which consist of a layer of coarse grained materials on top of the grooves and leading to an off-gas pipe system eliminates odors. This layer is covered by two more layers of fine-grained material. The mixture of trash and sewage sludge on the rotting plates has an average water content of 50%, which provides optimum living conditions for microorganisms. A vacuum is produced in the groove of the rotting plate so that air is drawn through the sludge, yielding a high percentage of oxygen to the microorganisms and carrying odors to the compost filter. The odors adhere to the filter and are decomposed by microorganisms in the filter. The waste gases are odorless. Mesophile and thermophile bacteria develop which raise the temperature within three days to 60-70 C. This temperature is maintained until all organic substances have been decomposed. The end product is sifted and used in agriculture or disposed of.

52872 APTIC NO. 77592

Kurusuna, K. and M. Suzuki

MITSUBISHI GALANT 1600 MCA. *(Mitsubishi Galant 1600 MCA). Text in Japanese. (Mitsubishi Juko Gih (Mitsubishi Heavy Ind. Tech. Rev.), 12(1):125-133, 1975.*

In order to comply with the 1975 Japanese emission standards, the Mitsubishi Motor Corp. developed an emission control package, MCA-II B. Special attention was paid to the safety and durability of the system as well as to the efficiency of the emission control itself. The MCA-II B is a combination of thermal reactor and exhaust gas recirculation. Improvements in mixture preparation and ignition timing were also made. This low-pollution engine has already been introduced in the market in the new model Mitsubishi Galant 1600 MCA. Exhaust emission levels of this new engine are 1.44 g/km for carbon monoxide, 0.02 g/km for carbon hydrate, 0.89 g/km for nitrogen oxides at 10 mode operation, and 47.8 g/test for CO, 5.57 g/test for CH, 8.2 g/test for NOx at 11 mode.

52873 **APTIC NO. 77601**

Lichtblau, F. and E. Rudy

PYROLYSIS - THE FUTURE THERMAL TRASH TREATMENT. *(Pyrolyse - Zukunft der thermischen Muellbehandlung). Text in German. Umweltschutz Staedtereinig. (Vienna), 12(7):168-169, 1975.*

Pyrolysis of trash is relatively non-polluting since no stacks are required and there is no residual matter. One cubic meter of trash yields 700 cu m of gas, of which 500 cu m are needed in the pyrolytical process itself, which takes place at temperatures between 800 and 1200 C. The surplus gas can be supplied by long distance pipe systems to consumers. The Destrugas process of Denmark, for example, yields a gas whose composition behind the gas scrubber is as follows: 55% hydrogen, 10% methane, 2% hydrocarbons, 11% carbon monoxide, 18% carbon dioxide and 4% water. The lower heating value of the gas is 3000 kcal/cu m, the upper heating value 5000 kcal/cu m. The relatively high equipment costs justify the application of pyrolysis only in large urban conglomerates or in large regions. In the latter instance transportation costs are high. The coke-like solid matter and the tar-like substance left from trash pyrolysis can be used for building roads.

52874 **APTIC NO. 77625**

MacDonald, Bryce I.

ALTERNATIVE STRATEGIES FOR CONTROL OF SULFUR DIOXIDE EMISSIONS. *J. Air Pollution Control Assoc., 25(5):525-528, May 1975.*

Three strategies which might be used by coal-fired steam electric plants to achieve ambient air quality standards for sulfur dioxide are compared. The three strategies are these: achieve state implementation plan requirements by burning low sulfur western coal; achieve state implementation plan requirements by burning high S coal and installing limestone scrubbers to remove SO2 from the flue gas; and meet ambient air quality standards by burning high S coal and employing Intermittent Control Systems. The analysis shows that the desired objective can be achieved using the intermittent control stragegy with substantially less impact on the environment, less consumption of energy, and at a much lower economic cost than using either stack gas scrubbing or low sulfur coal. (Author abstract modified)

52875 **APTIC NO. 76778**

Maeda, Isamu

A DESULFURIZATION METHOD FOR SINTERING MACHINE EXHAUST GAS BY ACTIVATED CARBON. *(Kasseitan ni yoru shoketsuki hai gasu datsuryu hoho). Text in Japanese. (Sumitomo Shipbuilding and Machinery Co., Ltd. (Japan)) Japan. Pat. Sho 50-15463. 5p., June 5, 1975. (Appl. March 2, 1970, 1 claim).*

This invention relates to the removal of sulfur dioxide by activated carbon from the exhaust gas from a sintering machine which uses materials containing large amount of sulfur. The SO2 and dust concentrations in the exhaust gas from a sintering machine differ at various stages. A window box attached to the sintering machine was divided into three sections, with a wind duct leading from each section. The first section was for exhaust gas containing low SO2 and dust concentrations, the second section for that containing low dust concentration but high SO2 concentration, and the third section for that containing low SO2 but high dust concentration. The exhaust gas from the first section was released to the atmosphere without treatment. The exhaust gas from the second was introduced to an activated carbon purifier for SO2 reduction and that from the third section was led to a dust collector. A heat exchanger was used for producing hot gas which was used to regenerate the activated carbon.

52876 **APTIC NO. 77591**

Masaki, K. and J. Maruoka

APPARATUS FOR EXHAUST GAS CONTROL. *(Haiki Gasu Taisaku Sochi). Text in Japanese. (Nissan Automobile Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 50-3444. 8p., Feb. 5, 1975. (Appl. June 12, 1971, 1 claim).*

An apparatus which control the amount of exhaust pollutants at the head of the gasoline engine is claimed. The amount of pollutants emitted from the gasoline engine depends strongly upon the temperature of the radiator and exhaust gas. At the beginning of the operation of the engine, the concentration of carbon monoxide and of carbon hydride in the exhaust gas are extremely high and gradually decrease with the increase of the temperature of engine. The apparatus provides a rapid increase in the temperature of the exhaust gas by the use of an afterburn effect which is induced by delayed spark timing and an excess supply of mixture gas. This device is designed to shift the timing of sparks and to open the throttle valve slightly during idling. The afterburn effect during normal driving also reduces the amount of pollutants in the exhaust, because it induces a higher temperature of the exhaust system.

52877 **APTIC NO. 76863**

Mlodzinski, Boleslaw and Jerzy Warych

EVALUATION OF VARIOUS SEPARATING MECHANISMS FOR REMOVAL OF AEROSOL PARTICLES FROM GAS IN A THREE-PHASE PACKED TOWER. *(Einschaetzung einzelner Anteile der Abscheidemechanismen fuer Aerosoltilchen aus Gas im dreiphasigen Fliessbett). Text in German. Staub, Reinhaltung Luft, 35(7):271-275, 1975. 19 refs.*

The inertial, diffusive, and interception deposition methods for removing aerosol particles were considered. Their roles in net removal efficiency were analyzed for various parameters, such as size, and density of packing, static height of packing, and liquid and gas flow rate. The separation of particles in the three- phase packed tower was achieved mainly through the forces of inertia, and to a lesser extent by interception and diffusion. The effect of each depended on operating conditions as well as on the aerosol flow. In the separation of hydrophobic particles, the forces of inertia and the diffusion mechanism dominated. In the separation of hydrophilic particles, the interception mechanism dominated. In the separation of hydrophilic particles, the interception mechanism had the greatest effect. The influence of inertia is determined (in order of importance) by the density and diameter of the packing material, the static packing, and the density of spraying. The influence of diffusion mechanism is determined by the density and diameter of the packing material, the density of spraying, and the static packing height. That of interception is determined by the diameter and density of the packing material, the density of spraying, and the static packing height.

52878 **APTIC NO. 77604**

Nahrmann, N.

HANDLING OF CEMENT CLINKER WITH THE AID OF SCREENING AT HIGH LOADING CAPACITY WITHOUT CAUSING NUISANCE TO THE ENVIRONMENT. *(Umweltfreundlicher Umschlag von Zementklinker durch Siebung bei hoher Verladeleistung). Text in German. Aufbereitungs- Technik, 16(7):359-361, 1975.*

Handling of bulk material, e.g., cement clinker, without causing damage to the environment can be accomplished economically if, prior to loading onto trucks, steamers, and railway cars, the superfine portions are removed from the material. The dust collectors, which are sensitive to fluctuating size distribution, can be considerably relieved by this separation process. Plant systems are now available which have been matched to the specific requirements of this practice and have been used to advantage for years at loading capacities of up to 500 ton/hr. The Niagara eccentric-type screen has been used in this fashion.

52879 **APTIC NO. 77580**

Nakajima, Yasuo and Mutsuo Onoda

RECIRCULATING EXHAUST GAS PURIFICATION EQUIPMENT OF INTERNAL COMBUSTION ENGINE. *(Nainen kikan no kanryu haiki joka sochi). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 50-18528. 2p., June 30, 1975. 2 refs. (Appl. April 2, 1971, 1 claim).*

A device for cleaning the recirculating exhaust gas to the carburetor is described. A filter used for this purpose was fitted to the middle of the engine exhaust pipe. Part of the exhaust gas passes through this filter and is recirculated to the carburetor. The filter can be made of sintered ceramics and alumina or stainless steel wool (which should be highly heat resistant and of high porosity). The filtered recirculating gas does not contain liberated carbon particles which produce engine trouble. The carbon particles deposited on the filter are burned on the filter surface due to the high temperature caused by the hot exhaust gas.

52880 **APTIC NO. 76881**

Nakashima, Yasuo and Yoshimasa Hayashi

NITROGEN OXIDE DISCHARGED SUPPRESSOR TO BE USED FOR AUTOMOBILES. *(Jidosha ni chisso sankabutsu haishutsu seigyo sochi). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-19049. 4p., June 10, 1975. (Appl. Jan. 20, 1969, 1 claim).*

One method to reduce the discharge of nitrogen oxides from automobiles is to recirculate the discharge gas into the engine. However, this method is accompanied by various disadvantages such as the lowering of the output power of the engine and the decrease of the stability of the engine. The present invention consists of a pipe which refluxes the discharged gas into the engine, a control valve for the refluxed gas, an element that detects the negative pressure exerted by high power operation of the engine, and an element that detects a definite range of rotation of the engine. The control valve for the refluxed gas is installed inside the refluxing pipe. By means of these elements and installations, the discharged gas is refluxed into the engine only when the engine is operating with high power as during the period of acceleration after starting and during the climbing of slopes. The discharge of nitrogen oxides is most marked when the engine is working at high output power. Therefore, the discharge of NOx is remarkably suppressed by the method of the present invention.

52881 **APTIC NO. 76797**

Nakayama, Takeshi

AN NOX GAS TREATMENT DEVICE. *(NOx gasu shori sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(8):745-755, Aug. 1975. 12 refs.*

Two nitrogen oxides removal devices, Sunmek models SV, SH and SD developed jointly by the Matsushita Electronics Industrial Co. and Sun Oh Reinitsu Co., based on the alkali absorption and dry adsorption methods are described. The Sunmek model SV consists of a pre-treatment tower with a multi-stage rack packed with a Raschig ring and sprayed with water or alkali solution. Here, the high NOx concentration is reduced to 1000-3000 ppm at the same time as the sulfuric acid mist and other toxic gases are removed. An absorption tower with a multi-stage rack is packed with activated carbon. Absorbent solution is sprayed at the rate of 2000 kg/sq m hr when the space velocity is 500-1000/hr. In the case of gas rich in nitric oxide, in order to maintain nitric oxide/nitrogen dioxide ratio of about one, the sodium nitrite from the pre-treatment tower is decomposed by sulfuric acid. The NO, which is subsequently air-oxidized to NO2 and added to the gaseous mixture entering the absorption tower, maintains the NO/NO2 ratio at about one. The average removal rate of NOx was in the range of 75-97%. The theoretical backgrounds of alkali absorption of NOx, oxidation of NO by homogeneous gaseous oxidation and heterogeneous gaseous catalytic oxidation, and adsorption of NOx by activated carbon are also reviewed.

52882 **APTIC NO. 77444**

Nindelt, Gerhard and Ulf Richter

SURVEY OF THE PRODUCTION PROGRAM OF THE VEB DUST REMOVAL TECHNOLOGY EDGAR ANDRE MAGDEBURG WITH REGARD TO THE PERSPECTIVE TASKS OF THE PLANT. *(Uebersicht ueber das Produktionsprogramm des VEB Entstaubungstechnik Edgar Andre Magdeburg unter Berueksichtigung der perspektivischen Aufgaben des Betriebes). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. 10:42-58, 1975.*

Some of the principles of de-dusting techniques and the basic design of de-dusting plants are described. The operation of various de-dusting plants, including the Edgar Andre factory in Magdeburg, are analyzed with regard to their construction and operating principles. The trends of development in the construction of de-dusting plants are discussed with regard to plant size, technology, and investment activities.

52883 **APTIC NO. 76882**

Nishida, Konosuke, Tsuneo Honda, and Takeo Tsuji

THE EFFECTS OF OZONE DEODORIZATION EQUIPMENT FOR THE SEWAGE ODOR. *(Gesui shuki ni taisuru ozone dasshusochi no koka). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 4(20):24-30, May 1975. 11 refs.*

The effectiveness of ozone deodorization equipment for sewage water odor is determined. The concentration of odorous compounds at a sewage plant in Osaka was measured before and after the ozone treatment. The plant treated 4000 to 10,000 cu m gas/hr at an ozone reaction bath. The rate of ozone injected to the bath was 150 g/hr. The gas samples before and after the treatment were collected into a plastic bag and analyzed by the gas chromatography equipped with flame photometry and a PEG 20 M column. The ozone concentration injected into the bath was 1530 to 1710 ppm and the ozone level in the treated gas was 0.13 ppm. The residual ozone was treated at another bath, lowering ozone concentration below 0.01 ppm before the final discharge into air. The gas chromatogram showed 12 peaks, among which the presence of methyl mercaptan, dimethyl sulfide, hydrogen sulfide, ammonia, trimethylamine, n-propyl mercaptan, and n-amyl mercaptan were identified. The concentrations in the untreated gas were 16.9 ppm, 1.30 ppm, 0.30 ppm, 0.0052 ppm, less than 0.0005 ppm, 31.3 ppm, and 4.75 ppm for methyl mercaptan, dimethyl sulfide, hydrogen sulfide, ammonia, trimethylamine, n-propyl mercaptan, and n-amyl mercaptan respectively, while the concentrations of the corresponding compounds in the treated gas were 12.6 to 12.8 ppm, 0.72 to 1.12 ppm, 0.29 to 0.0098 ppm, 0.0036 to 0.0047 ppm, less than 0.0005 ppm, less than 0.01 ppm, and 1.64 to 4.20 ppm. Therefore the removal efficiencies by the ozone equipment were 24.3 to 25.5 for methyl mercaptan, 13.9 to 44.6% for dimethyl sulfide, 3.4 to 96.8% for hydrogen sulfide, 9.7 to 30.8% for ammonia, better than 99.9% for n-propyl mercaptan, and 11.6 to 65.5% for n-amyl mercaptan.

52884 **APTIC NO. 77579**

Nishimoto, T., S. Yokoyama, H. Ogawa, and M. Hino

CATALYSTS FOR THE REDUCTION OF NITROGEN OXIDES IN FLUE GASES. *(Nensho hiagasu chu no chisso sanka-butsu kangen yo shokubai ni kansuru kosatsu). Text in Japanese. Mitsubishi Juko Giho (Mitsubishi Heavy Ind. Tech. Rev.), 12(3):372-378, 1975. 3 refs.*

The catalytic reduction process for the removal of nitrogen oxides from flue gas was investigated. The reduction process is selective in the case of using ammonia as a reactant and non-selective in the case of using carbon monoxide as a reactant. The noble metals and base metals are used as catalysts of single or multiple components. Characteristics of selective and non-selective reduction reactions and the catalytic reduction apparatus are described. The selection of carriers (type, shape, form), preparation methods and reaction characteristics of catalysts are discussed. The effects of space velocity, NOx concentration, NH3/nitric oxide ratio, and the components of the flue gas (water, oxygen, CO, sulfur dioxide, carbon dioxide) on the catalytic reduction of NOx with NH3 were investigated. The effects of flue gas dust and sulfur oxides on catalytic activity are also discussed.

52885 **APTIC NO. 77613**

Onoda, Mutsuo, Takeharu Oguri, and Yoji Hasegawa

CATALYTIC CONVERTER. *(Shokubai konbata). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-20186. 2p., June 19, 1975. 2 refs. (Appl. July 16, 1970, claims not given).*

A structural device to hold catalyst used in the auto exhaust gas cleaning is described. The catalytic converter, which is installed within the exhaust pipe, encloses a radiator-type metal lattice on which an appropriate catalyst of a thickness of 0.5 mm is baked. The opening of the lattice component faces the exhaust gas flow. When the exhaust gas passes through the lattice component, the catalyst cleans the unburned components. Since the catalyst is baked on the metal lattice, the blockage of the exhaust gas flow automobile vibration is prevented and the catalyst is held steady. The whole metal lattice component can be replaced externally by removing two bolts on the catalytic converter.

52886 **APTIC NO. 77583**

Onozaki, Atsuo and Kazumasa Tezuka

ON THE OPERATION OF STACK GAS DESULFURIZATION FACILITIES OF DOWA-TYPE BASIC ALUMINUM SULFATE-GYPSUM METHOD AT THE OKAYAMA REFINERY. *(Okayama seirenjo ni okeru dowashiki enkisei ryusan aruminium - sekko ho no kaien datsuryu setsubi no sogyo ni tsuite). Test in Japanese. Nippon Kogyo Kaishi (J. Mining Met. Inst. Japan), 91(1046):316-320, April 1975.*

A desulfurization process using basic aluminum sulfate solution as an absorbent was developed. Flue gas (300,000 N cu m/hr) containing 0.06% sulfur dioxide and 0.005% sulfur trioxide was passed through two absorbing towers where the SOx was absorbed by basic aluminum sulfate solution. The resulting gas which contained 300-700 ppm SOx, was led to a packing tower where more SOx was removed, and the treated gas was released after passing through a mist cottrell. The resulting solution from the absorbing towers was introduced to an oxidation tower in which air was bubbled and the aluminum sulfite was oxidized to form sulfate ion. The solution was recirculated to the absorbing tower. A given aliquot of the solution in the oxidation tower was pumped to a neutralization tower to which calcium carbonate was added. The concentrated slurry of gypsum was separated by centrifuge and the mother liquor was recovered for use as an absorbent.

52887 **APTIC NO. 76760**

Orth, H. W., H. Peters and U. Koehler

THE USE OF STRAW AS FUEL. *(Stroh als Brennstoff). Text in German. Landtechnik, 30(6):279-281, 1975.*

Incineration as a method of straw disposal is discussed. In an experimental incinerator, the combustion properties of straw were determined as well as the extent of energy conversion and the composition of the waste gases at various primary air supply levels. The high energy conversion of loose material was reduced by fuel compaction. Through compaction, the combustion process was slowed down and constant amounts of energy were liberated over a longer period of time. The energy conversion rate of compacted straw can also be controlled by an adequate supply of primary air. At low primary air supply levels, combustion is slow. More complete combustion was achieved through an increase of the air flow. The carbon monoxide concentration in the waste gas never exceeded 0.5% by volume.

52888 **APTIC NO. 77476**

Ozasa, Minoru and Takeshi Nakayama

SOLVENT REMOVAL BY ACTIVATED CARBON WITH INDIRECT HEATING METHOD. *(Kanshiki dachaku ho ni yoru yozai no kaishu gijutsu). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(8):927, Aug. 1975.*

Organic solvent removal and its recovery by activated carbon are summarized. The desorption of organic solvents on the carbon bed is accomplished by a direct steam injection method or indirect heating method. In the latter method, the carbon bed is heated by pipes containing steam. The temperature of the carbon bed is generally adjusted to 100 to 150 C, and the higher temperature causes the firing of the organic solvents on the carbon bed. The activated carbon is ignited by itself at 400 C in air, but the firing temperature decreases to 200 C with the presence of 3000 ppm inflammable compounds on the carbon bed. The use of inert atmosphere or control of oxygen content is necessary for the desorption of inflammable compounds in order to prevent the firing. The desorbed gases are condensed; however, the condensed compounds contain about 10% water from air when air is used as the desorption atmosphere. More effective desorption can be made if the desorption is made under a vacuum or reduced pressure system rather than at atmospheric pressure. The activated carbon acts both as adsorber and catalyst. In the latter role, the adsorbed compounds are oxidized in the presence of oxygen in the system. In such cases, the recovered compounds contain several oxidation reaction products.

52889 **APTIC NO. 76791**

Ozawa, Taisei, Shigeo Aono, Kenji Masaki, Tomoji Inui, and Yasunori Mori

DEVELOPMENT OF ELECTRONIC ADVANCING APPARATUS. *(Denshi shinkaku sochi no kaihatsu). Text in Japanese. Preprint, Japan Society of Automotive Engineers, Tokyo, p. 137-140, 1975. (Presented at the Japan Society of Automotive Engineers, Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

An electronic advancing apparatus for internal combustion engines is described. Two variables were treated with two function generator circuits. The trigger was treated with a trigger shaper and the rate of revolution was treated with a rotation rate detecting circuits. The signals from these circuits were applied to an angle advancing control circuit. The signal from this circuit was applied to a transistor ignition system which drove the ignition coils. The pressure of the inhaled air, the temperature of the engine, and the degree of throttle opening were used as functions to be applied to the function generator. A system having three governor characteristics was tested. With this electronic governor, two advancing characteristics were realized. Also, it was possible to realize delay characteristics, which are impossible with conventional mechanical governors. It was also possible to choose any one of these three characteristics. Such a choice of governor characteristics is almost impossible with a mechanical governor. The power source was a 6-volt battery. The electronic device successfully operated between -40 to 80 C.

52890 **APTIC NO. 77596**

Saeki, Isamu

EVALUATION OF A LOW-POLLUTION ENGINE, SEEC-T, OF THE FUJI HEAVY IND. CO. *(Fuji Juko no teikogai engin SEEC-T o Bunseki suru). Text in Japanese. Jidosha to Seibi (Automob. Maint.), 29(4):46-55, April 1975.*

The test results for the SEEC-T engine were as follows: 0.15 0.17 g/km for hydrogen carbonate, 1.70 1.81 g/km for carbon monoxide, and 0.78 0.97 g/km for nitrogen oxides at 10 mode dirving condition. All these values are lower than the 1975 standard of 0.25 g/km for HCO3, 2.10 g/km for CO, and 1.20 g/km for NOx. This engine produces clean exhausts with no catalyst or thermal reactor. Pre-heating of a homogeneous lean mixture gas in the intake manifold, lower maximum temperature of combustion gas in the cylinder, and long and hot exhaust port which has an air suction valve to introduce fresh air are all essential parts of this low pollution engine.

52891 **APTIC NO. 77590**

Sagara, H., T. Eto, and S. Aoki

CLEANING APPARATUS FOR HYDROGEN SULFIDE-CONTAINING GASES. *(Ryuka suiso ganyu gasu senjo sochi). Text in Japanese. (Mitsubishi Heavy Ind. Co. Ltd., Tokyo (Japan), Japan. Pat. Sho 50-3263, 3p., Feb. 1, 1975. (Appl. June 27, 1964, 2 claims).*

A multi-step sodium hydroxide bubbler is a well established cleaning apparatus for gases containing hydrogen sulfide. However, because of its inconvenient construction, miscellaneous operations are needed for optimum cleaning efficiency. The structural modifications of the inlet and outlet of gas and the NaOH solution of this device provide more convenient and efficient operation. The installation of a bubble guide and a gutter on the top of the bubble guide are important. The gutter collects the HS absorbed by the NaOH solution. The solution is then drained off from the bottom of the gutter. These modifications permit convenient operation even during replacement of the solution and result in lower operating costs.

52892 **APTIC NO. 77385**

Saito, Kazuhiko

FILTERS FOR DUST COLLECTORS. *(Shujin Filuta sochi). Text in Japanese. (Nippon Seimitsu Kogyo Co., Ltd., Kawasaki (Japan)) Japan Model Util. Sho 50-15663. 2p., May 15, 1975. (Appl. April 28, 1971, 1 claim).*

A patent is claimed for a new filter design. A number of bag filters are kept parallel by means of a supporter from which the bag filters are suspended. Another supporter is placed at the bottom of the series of the bag filters to hold the lower ends of the bag filters. In this case the distances among bag filters are made to be narrower at the top and wider at the bottom. Morever, the whole body of the bag filters is vibrated up and down with the aid of the supporters present at the bottom. In the widely used conventional filters, no bottom frame or supporter is used. Therefore, these filters collide with one another with the up-and- down motion of the filters, resulting in damage to the filter bags. A wavy spacer, made of a plastic such as vinyl chloride, is preferably placed in each filter bag to prevent the adhesion of confronting sides and to accelerate the passage of gases to be treated with the dust collector. The vibrating mechanism is connected to the lower frame or supporter, the upper supporter being fixed.

52893 **APTIC NO. 77550**

Sakurai, Hideyuki

MUFFLERS FOR THE CLEANING OF GASES DISCHARGED FROM AUTOMOBILES. *(Jidosha no haiki o seikjoka suru mafura). Text in Japanese. (Assignee not give.) Japan. Model Util. Sho 50-19043. 2p., June 10, 1975. 2 refs. (Appl. Jan. 22, 1970, 1 claim).*

Mufflers are conventionally used to eliminate the noise of gases discharged from automobiles by the rapid expansion. Packing of this muffler with glass fiber pieces mixed with active carbon powders is effective to decrease the poisonous gas content in the gas discharged from the automobiles. The poisonous gases are adsorbed by the active carbon held in the glass fiber. Thus, a muffler consists of an empty cylinder with a large diameter and two pipes with smaller diameters, which are usually coaxially installed at both ends of the main body of the muffler as inlet and outlet pipes. Inside the main body of the muffler, two wire nets are fixed in the direction perpendicular to the direction of the axis of the muffler. The distance between the 2 nets is less than that of the inner length of the main body of the muffler. Glass fibers are packed between the glass nets in the direction parallel to the axis of the muffler. Active carbon powders are well mixed with the glass fiber so as to keep a sufficient amount of the powder. The flow of gases in the muffler is not reduced by the presence of the glass fibers because the latter is placed parallel to the direction of the flow.

52894 **APTIC NO. 76824**

Sano, Minoru and Yoshiyuki Inoue

REMOVAL METHOD OF THE DUST AT THE COKE OVEN WORKSHOP. *(Koukusu-ro sagyo ni oite hassei suru funjin no jyoko hoho). Text in Japanese. (Mitsubishi Chemical Industries Ltd. (Japan)) Japan. Pat. Sho 50-10601. 3p., April 23, 1975. (Appl. Oct. 2, 1971, 1 claim).*

A method for reducing the amount of dust produced during charging and discharging operations of coke ovens is described. A dust collector hood is placed over the coke guide cart. The duct of the dust collector hood is connected to a suction blower and dust collector for the removal of dust particles and the discharge of the gas to the smoke stack. Dust particles above 1 micron are removed with 97% collecting efficiency; however, particles below 1 micron are not removed and are discharged into the air. For more efficient dusst removal, the exhaust gas from the dust collector is led through the suction blower into a coke extinguisher tower where the submicron particles are removed by a water sprayer used for extinguishing coke fire and a dust collecting spray system used for the removal of dust particles produced by the extinguishing process. A practically dust-free exhaust gas is discharged into the air. Flow diagrams of the dust removal systems are provided.

52895 **APTIC NO. 76823**

Satake, Shoji and Akio Naoi

DIRECT HEAVY OIL DESULFURIZATION METHOD BY METALLIC SODIUM. *(Kinzoku natoriumu ni yoru juyu no chokusetsu datsuryu ho). Text in Japanese. (Satake Research Inst. (Japan)) Japan. Pat. Sho 50-14649. 3p., May 29, 1975. 3 refs. (Appl. June 3, 1969, 1 claim).*

An economical direct desulfurization method for heavy oil using metallic sodium is described. To the dehydrated heavy oil or the heavier fraction, molten metallic Na in an amount at least equivalent to the sulfur content of the heavy oil or less than 10 wt% of the heavy oil is added. The mixture is heated for several hr while stirring in a reactor equipped with a reflux condenser. The solid sodium sulfide produced is separated from the heavy oil and metallic Na mixture by filtering at a temperature above the melting point of metallic Na (150-190 C). The filtrate is cooled to solidify the metallic Na, and the solid metallic Na is then separated from the heavy oil by filtration or decantation at temperatures below the melting point of metallic Na (70-80 C). The heavy oil filtrate is marketed as dehydrated heavy oil without further treatment, and the metallic Na obtained is reused for the desulfurization reaction. The Na2S obtained is recrystallized from water and marketed as crystallized hydrated Na2S.

52896 **APTIC NO. 76840**

Sawada, Seiji, Yoshitomi Kaneko, Shotaro Kiga, and Mitoyoshi Kikuchi

A TREATMENT METHOD FOR FLUE GAS. *(Endo gaso no shori hoho). Text in Japanese. (Nippon Soda Co., Ltd. (Japan)) Japan. Pat. Sho 50-10542. 3p., April 22, 1975. 1 ref. (Appl. April 20, 1970, 1 claim).*

A treatment method for the removal of sulfur dioxide in flue gas is described. Flue gas containing 0.2% SO2 and 13% carbon dioxide was contacted with 50 l of electrolyte solution, which was prepared from 7.12 kg sodium hydroxide, 7.81 kg sodium chloride and 47.57 kg water, for 40 hr at 4-4.5 cu m/min. The SO2 concentrations was reduced to 0.005% and the resulting solution contained 11.39 kg NaHCO3, 0.60 kg sodium carbonate, 17.73 kg NaCl, 1.77 kg sodium sulfite and 47.09 kg H2O. The sodium bicarbonate was separated by centrifuge and was heated at 170-180 C for 2 hr. The resulting sodium bicarbonate, which contained a small amount of NaCl, Ca2CO3 and Na2SO3 was dissolved in water (7.2 g in 29 kg H2O) and 870 cu m of flue gas containing 0.2% SO2 and 13% CO2 was passed through the solution at 3-4 cu m/hr. The SO2 concentration was reduced to 0.008%. The resulting gas which contained CO2 was contacted with caustic soda to form sodium bicarbonate. The sodium bicarbonate was separated and the mother liquor was neutralized with hydrochloric acid to form NaCl which was then recirculated.

52897 **APTIC NO. 76809**

Senjo, Teizo

PRESENT STATUS OF THE MORETANA DESULFURIZATION-NOX REMOVAL METHOD. *(Moretana shiki datsuryu-dassho-ho no genjo). Text in Japanese. Preprint, Japan Management Assoc., Tokyo, p. 33-49, 1975. (Presented at the Japan Management Association Symposium on Pollution Engineering, Tokyo, Japan, March 17, 1975.)*

Methods for removing nitrogen oxides and sulfur dioxide from stack gas are reviewed, with particular emphasis on the Moretana process. Typical NOx removal methods include: the Mitsubishi Heavy Industries Method, Mitsubishi Metal Industries Method, Fuji Chemical Water Industries Method, Kureha Chemical Method, Kawasaki Heavy Industries Method, and the Chiyoda Chemical Industries Method. The Fuji Chemical Water Industries Method relies upon the Moretana process. In this process, nitric oxide is oxidized to nitrogen dioxide with chlorine dioxide or ozone. Both SO2 and NO2 are absorbed in a Moretana absorption tower. The flow rate of the gas in this tower is kept as high as 5-7 m/sec. The SO2 and NOx concentrations at the exit of the Moretana tower are 4-5 and 10-19 ppm, respectively, when a heavy oil containing 1.5% sulfur is burned.

52898 **APTIC NO. 76750**

Shelef, M.

NITRIC OXIDE: SURFACE REACTIONS AND REMOVAL FROM AUTO EXHAUST. *Catal. Rev. -Sci. Eng., 11(1):1-40, 1975. 118 refs.*

Surface reactions of nitric oxide and its removal from automobile exhaust are reviewed. Topics discussed include: the chemisorption of NO, the heterogeneous decomposition of NO, the reaction of NO with ammonia and hydrocarbons, the mechanisms of NH3 formation in wet and dry catalytic NO reduction systems, three-way catalysts, catalytic materials for NO reduction, the poisoning of NO reduction catalysts, and the performance of vehicle nitrogen oxide catalysts. Data on the durability of dual-catalyst systems show that as of the middle of 1974 the systems were not suitable for practical implementation. Removal efficiencies are tabulated for ruthenium-containing NOx catalysts tested over durability runs of up to 25,000 mi and vary from 20-82%, depending on the mileage.

52899 **APTIC NO. 77396**

Smith, Elbridge M. and Robert L. Lucas

INFORMATION REQUIRED FOR THE SPECIFICATION, PURCHASE AND PERFORMANCE EVALUATION OF INDUSTRIAL BAGHOUSES (FABRIC FILTERS). *J. Air Pollution Control Assoc., 25(7):715-720, July 1975. 20 refs.*

Guidelines for the specification, purchase, and performance evaluation of industrial baghouses are outlined. Information is presented on the selection of filter fabric, bag shape, bag cleaning, filter area, information required by manufacturers, gas flow rate, moisture content, and temperature, chemical and physical characteristics of the gas, solids flow rate, chemical and physical characteristics of the solids, testing, and specifications. Baghouses are versatile devices that can be used to control many dust emission problems, but caution is advisable when the dust is sticky of hygroscopic. Bag filters should not be applied where dust and mist both are present in the gas. The application limits are determined primarily by the physical and chemical characteristics of available fabric filters. The size of baghouses is directly related to gas flow. Filter size is also strongly affected by the quantity and physical characteristics of the thickness and porosity of the dust cake which collects on the filter fabric. The great variety of filter bag shapes and sizes permits use of baghouses in low and high headroom situations. Evaluation of dust control system alternatives is required for determination of the most practical and least expensive combination of components for a given problem.

52900 **APTIC NO. 76767**

Stief, E.

METHODS FOR REDUCTION OF THE EMISSION OF AIR POLLUTANTS FROM FOUNDRIES. *(Beeinflussungsmoeglichkeiten zur Minderung des Aufkommens an Luftschadstoffen in Giessereibetrieben). Text in German. Technik (Berlin), 30(6):393-395, 1975. 1 ref.*

In foundries, large amounts of air pollutants, particularly dust, develop during emptying, machine molding, casting, and transport of the molding material on conveyor belts. Rarely applied in practice, but highly efficient for reduction of the emissions from these processes, is the method of drawing off air with a simultaneous supply of compensation air amounting to about 60% of the air quantity drawn off. The dust emissions from the emptying of molds and the cooling of the molding material can be reduced by using rapidly crumbling molding material and by cooling molds low and wide in shape. Conveyor belts for the transport of molding material are usually unnecessarily long, thus causing easily-avoidable dust emissions.

52901 **APTIC NO. 76790**

Suzumoto, Sakuryo, Tomizo Saito, and Kunio Koike

THE EFFECTS OF EXHAUST GAS RECIRCULATION ON THE PARTS OF ENGINES. *(Haiki saijunkan ga engine buhin ni oyobosu eikyo ni tsuite). Text in Japanese. Preprint, Japan Society of Automotive Engineers, Tokyo, p. 133-136, 1975. (Presented at the Japan Society of Automotive Engineers, Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

The effects of exhaust gas recirculation on automobile engine parts was investigated. A Toyota Type 8RD engine was driven at 3/4 load and at 4000 rpm for 181 hr. The fuel used was lead-free gasoline containing 35% aromatics. After the test, the engine was dismantled and all parts were examined. Some pitting corrosion was noticed on the top and edge of the second and third pistons. The weight loss of the pistons was about 0.124-0.231 g. These losses are somewhat larger than the losses (0.038-0.168 g) found in the same engine without EGR. The wear of piston rings was also large. The weight loss of the top ring was almost 10 times that of a ring used without EGR. Oil ring wear was increased three to five times with EGR. Valve recession was hardly detectable, but some pitting was noticed on the seat of the valves. The thickness change of the cylinder head gasket was slightly greater than that without EGR. Hardly any change in the inner cylinder diameter was observed. Also, no change was observed on the valve guides. Light brown deposits on the spark plugs were increased by EGR. Corrosion in the exhaust system was decreased by EGR because of the decrease in nitrate ion concentration in the discharged gas.

52902 **APTIC NO. 76782**

Takayasu, M., Y. Annen, K. Kanzaki, and Y. Morita

CATALYTIC OXIDATION OF NO AND EFFECTS OF CO ON THE REACTION. *(Kinzobu sankabutsu shokubai jo no NO sanka hanno to soreni oyobosu CO no eikyo). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan) (Tokyo), 54(577):314-320, May 1975. 7 refs.*

Sample gas containing 500 ppm nitric oxide, 5.0 vol% oxygen, 0 or 1.1 to 4.4 vol% carbon monoxide and nitrogen (balance) was introduced to a quartz tube (inside diameter 15 mm) packed with a 4 g of catalyst. The catalysts were prepared by adding gamma- alumina to aqueous solutions of nitrates of manganese, chromium, cobalt, nickel, iron, copper and zinc or that of ammonium salts of vanadium, molybdenum, and tungsten followed by evaporation and firing at 550 C (350 C for CO) for 3 hr. The oxidation was carried out at space velocity 18,000/hr at 250 C. The catalytic activity was in the decreasing order of platinum, Mn, Cr, Co, Ni, Cu, Fe, V, Zn, Mo and W. At CO concentration of 2.0 vol%, the catalytic activity of Pt-, Mn-and Cr-A12O3 decreased while that of CO-Al2O3 increased. The catalysts with low initiation temperature for CO oxidation also showed low initiation temperature for NO oxidation. Carbon dioxide had no effect on the NO oxidation on Pt-, Co-, Mn-and Cr-Al203.

52903 **APTIC NO. 76822**

Tamaki, Shigeo and Toru Nakagawa

CARBURETOR. *(Kikaki). Text in Japanese. (Hitachi, Ltd. (Japan)) Japan. Pat. Sho 50-14691. 3p., May 29, 1975. (Appl. Nov. 29, 1971, 1 claim).*

A carburetor with fuel passage actuated during deceleration is modified for the purpose of achieving smooth carburetor operation and good durability. The fuel-air passage which is actuated at deceleration is operated by a servo valve which is attacheed to a servo diaphragm dividing two air chambers. One air chamber is connected to a negative pressure chamber through a control valve actuated by the variation in negative pressure in the negative pressure passage connected to the downstream of throttle valve. The fuel-air mixture which seeps into the air chamber is trapped, and respiration takes place between the air passage and the fuel-air passage with the displacement of the servo diaphragm. The fuel-air mixture trapped in the air chamber has a deteriorating effect and reduces the life of servo diaphragm. The fuel-air mixture fed back into the fuel-air passage causes irregularity in the mixing ratio. To eliminate such shortcomings, the passage for releasing the trapped fuel-air mixture is placed between the air chamber and the negative pressure passage for the release of the trapped fuel-air mixture.

52904 **APTIC NO. 77593**

Tamura, Z. and T. Hishinuma

SULFUR OXIDES REMOVAL APPARATUS FOR COMBUSTION WASTE GASES. *(Nensho hai gasu nado no nakai fukumareru iou sankabutsu no kyu-datchaku sochi). Text in Japanese. (Hitachi Seisakusho Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-3264. 4p., Feb. 1, 1975. (Appl. March 25, 1966, 1 claim).*

It is well known that sulfur oxides (SO2, SO3) are absorbed by activated charcoal in the form of sulfuric acid, which is easily removed by water rinsing. The rinsed charcoal has to be reactivated for the next operation of absorption of sulfur oxides. Absorption, water rinsing, and reactivation of charcoal can be done successively during the cleaning of the waste gas using this device, since the chamber of the gas-cleaning system is divided into parallel compartments. In this way, the path of the waste gas can be directed to a compartment containing reactivated charcoal. This device could also be used for air pollutants other than sulfur oxides.

52905 **APTIC NO. 76816**

Tanaka, Katsuhiko, Kiyoshi Hashimoto, and Kazuma Matsui

A CATALYST COMPOSITION FOR CLARIFICATION OF INTERNAL COMBUSTION ENGINE EXHAUST GAS. *(Nainen kikan haikigasu jokayo shokubai soseibutsu). Text in Japanese. (Nippon Denso Co., Ltd. (Japan)) Japan. Pat. Sho 50-14238. 3p., May 26, 1975. (Appl. Dec. 3, 1970, 1 claim).*

Catalyst compositions effective for the reduction-decomposition of nitrogen oxides in internal combustion engine exhaust gas are described. A mixture consisting of 5-40 wt% of cobalt oxide, 5-40 wt% of nickel oxide, and 0.001-0.1 wt% of palladium oxide (in regard to the total weight of carrier) is carried on heat resistant and porous carriers such as alumina, magnesia, silica-alumina, silica-magnesia, silica-zirconia, zirconia, or zirconia-alumina. An organic or inorganic binder is added to the carrier material, pelleted into 3-8 mm diameter and calcined at 1000-1500 C. The carrier pellets prepared are immersed in the mixture of catalyst compound (cobalt sulfate, cobalt acetate, nickel nitrate, nickel acetate and palladium nitrate with varied ratios) and calcined at 600-750 C for 3-5 hr. In the exhaust system of internal combustion engines the catalytic reduction-decomposition device containing the abovementioned catalyst is placed between the exhaust manifold and muffler. The amount of NOx (g/mile) in exhaust gas is reduced to less than 1/3-1/4 of the original concentration, indicating effectiveness of this catalytic decomposition device for air pollution control.

52906 **APTIC NO. 76753**

Verstraete, W., H. Vanstaen, G. Neukermans, and M. Debruyckere

DEODORIZATION OF AIR BY MEANS OF A BIOLOGICAL AIR-WASHER. *(Desodorisation de l air a l aide d un filtre biologique). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 28(376):134-139, March 1975. 7 refs.*

A deodorization device containing activated sludge is described. Dimethylamine is used as the model compound. Factors governing the efficiency of the deodorizing process include the coefficient of transfer of the pollutant from the gaseous to the aqueous phase and the biodegradation rate constant of the pollutant in the aqueous phase. The maximum capacity of the washer is 8.100 mg of DMA/hr, corresponding to a maximum concentration in the air of 4.690 mg DMA/1.000 sq m air (flow rate of 1.730 cu m/hr).

52907 **APTIC NO. 77600**

Werner, Heinz

THE REDUCTION OF DUST AND NOISE DURING TRANSLOADING AND TRANSPORT OF SOLID FUELS, AN IMPORTANT CONTRIBUTION TO THE IMPROVEMENT OF ENVIRONMENTAL PROTECTION. *(Die Eindaemmung von Staub und Laerm beim Umschlag und Transport fester Brennstoffe, ein wichtiger Beitrag zur Verbesserung des Umweltschutzes). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. (10):25-41, 1975.*

Technical and organizational measures for the control of dust emissions and noise in coal handling, transportation and reloading in East Germany are reviewed. Dust emissions can be effectively reduced by reducing the number of material handling and transfer points in briquetting and coal sorting plants and in the railroad operation, as well as by the use of closed trucks and special containers for transportation. Experiments with dust- tight screw conveyors, fully encapsulated belt conveyors, and wetting agents (water vapor and water with chemicals) have been done. The use of wetting agents and suction devices with wet type dust separators in briquetting plants is, however, not economical.

52908 APTIC NO. 77624

Wintrell, R.

THE KOPPERS-TOTZEK GASIFICATION PROCESS. *Chem. Eng. Progr., 71(4):63-65, April 1975.*

The effectiveness of the Koppers-Totzek gasification process for the removal of sulfur is discussed. Approximately 95% of the total sulfur from the coal can be accounted for in the gas. In gasification, the S forms hydrogen sulfite and carbonyl sulfide. In practical operation, the H2S:COS ratio is approximately 9:1. The primary features of the Koppers-Totzek process is its inherent ability to gasify the full range of conventional hydrocarbon fuels, plus some less conventional types. Solid fuels gasified cover the range from peat and lignites through bituminous to anthracite coals. Other fuels successfully gasified with Koppers-Totzek include heavy fuel oil, vacuum refinery residue (with over 340 ppm of vanadium), refinery off-gases, and in Japan the simultaneous gasification of coke oven gas and coal.

52909 APTIC NO. 77388

Yamaguchi, T.

TECHNOLOGY TO PREVENT EVAPORATION AND EMISSION OF HYDROCARBONS. *(Tanka suiso no johatsu-haishutsu boshi gijutsu). Text in Japanese. MOL., 3(6):25-31, June 1975.*

The evaporation of hydrocarbons can be prevented by keeping the volatile substances at a low temperature or under high pressure, or in a floating roof tank. The former two methods are comparatively easy when dealing with a small volume. The latter method includes trapping the hydrocarbon vapors which are emitted from the vessel to the atmosphere. Emission sources of hydrocarbons include: oil refineries, oil tanks, supply stations, and transport vehicles. Vapor return methods are not suitable when either of two tanks is of the floating roof type. Even if the vapor return method is applicable, it is not the best control measure. Both vapor return and absorption or condensation in combination are preferred. Absorption or condensation methods must be used when a floating roof tank is involved. Among absorption methods, the fixed floor type has a short life, requiring renewal of the absorbent. Circulating liquid absorption methods require complicated inner structures to make them effective. Condensation is more effective, having a 97-98% absorption rate and a high recovery ratio also. However, this method requires large equipment, and the running cost is high.

52910 APTIC NO. 77582

Yamamoto, Yashuhiko, Shinji Kutsuzawa, and Hirofumi Inoue

A TREATMENT METHOD FOR GASES CONTAINING CHLORINE GAS. *(Enso konyu gasu no shori hoho). Text in Japanese. (Showa Denko Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-24264. 2p., Aug. 14, 1975. (Appl. Aug. 25, 1971, 1 claim).*

A treatment method for gases containing chlorine gas is described. The removal process of chlorine consists of two reaction steps: a gas-liquid phase reaction and a gas-gas phase reaction. The chlorine gas reacts with sodium hydroxide solution to produce sodium hypochlorite, sodium chloride, and water. Unreacted chlorine is further treated by ammonia gas to produce ammonium chloride and nitrogen gas. The ammonium chloride reacts with excess sodium hydroxide to produce ammonia gas for recirculation. This two-step treatment increases removal efficiency, and a treated gas containing less than 1 ppm chlorine gas can be obtained.

52911 APTIC NO. 77581

Yamamura, Toshio, Kazuyoshi Oka, and Seiichiro Karino

A REMOVAL METHOD FOR NITROGEN OXIDES. *(Chisso sankabutsu no jokyo hoho). Text in Japanese. (Kanto Denka Kogyo Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-18872. 2p., July 2, 1975. 1 ref. (Appl. Jan. 28, 1972, 1 claim).*

A removal method for nitrogen oxides by fused urea or mix fusion products of urea and its derivatives is discussed. The fusion product reacts with nitrogen dioxide and produces nitrogen gas, carbon dioxide, water, and ammonium nitrate. The range of optimum reaction temperature was 135 to 150 C for fused urea, and 110 to 170 C for the mixed fusion products. The result of one test using this method was that the NOx concentration in the treated gas was 310 ppm when the 1500 ppm NOx gas was treated with 150 g fused urea at 135 C. If the process were repeated more than twice, the denitrification efficiency could be improved. The urea derivatives used were biureids, triureids, and urea nitrate.

52912 APTIC NO. 76775

Tokyo Gas Co., Ltd. (Japan)

DEVELOPMENT OF APOC LOW NOX BURNER. *(APOC tein NOx bana no kaihatsu). Text in Japanese. Nippon Gasu Kyokai shi (J. Japan Gas Assoc.), 28(6):37-39, June 1975.*

The APOC low nitrogen oxides burner for city gas developed by the Tokyo Gas Co. is designed to reduce the emission concentration of NOx to 20-40 ppm. The preliminary structural and functional tests were conducted with 100,000 kcal/hr burner, and the 5.5 million kcal/hr burner for boilers was developed by component modification and scale up. The principle of APOC burner is complete two-stage combustion. The primary combustion is low air ratio premix combustion in the burner, by which the city gas containing hydrocarbons is decomposed to hydrogen and carbon monoxide. The primary combustion gas is injected into the combustion chamber for secondary combustion, where the NOx formation is controlled by adjusting the air ratio and flame pattern. The theoretical background for the low NOx burner is given. The characteristics of the APOC burner are described with a schematic diagram.

52913 APTIC NO. 76812

Ministry of International Trade and Industry (Japan)

NONGOVERNMENTAL INVESTMENT FOR ENVIRONMENTAL POLLUTION PREVENTION EXCEEDED 1.3 TRILLION YEN. *(Minkan no kogai boshi setsubi toshi 1-cho 3000 oku en o kosu). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), p. 37-46, June 1975.*

The amount of money to be invested for environmental pollution prevention in Japan is estimated to exceed the amount spent in the preceding year by 40.8%. The investment is estimated to occupy about 19.7% of all investments to be made in 1975 in all industries. However, prices are up by 14.6% on the average. The net increase is thus nil. In 1974, the investment made for pollution prevention was $2,800,000,000 and was 89.9% above the preceding year. The increase in investment for pollution prevention was especially significant in the petroleum, power generation, and steel making industries. Most of the investment for pollution prevention in the petroleum industry is related to the desulfurization of heavy oil. This investment occupies 81% of all investments for pollution prevention in this industry. For gaseous desulfurization and decomposition of heavy oils, 17% will be spent. For smoke desulfurization, only 2% will be spent. Steel industry is confronting many problems related to the prevention of smoke, dust, and sulfur compounds. In the power industry, the most important problem is the suppression of nitrogen oxides. The paper and pulp industry is confronted with odor problems. Data are tabulated for the present state of investment for pollution prevention in Japan.

52914 **APTIC NO. 76865**

National Research Inst. for Pollution and Resources (Japan) and Mitsubishi Heavy Industries, Ltd. (Japan)

PRACTICAL STUDIES ON THE CATALYTIC REDUCTION OF NOX WITH NH3. *(NOx no anmonia sesshoku kangen shokubai no jitsuyoka kenkyu). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 10(2):37-58, March 1975.*

A dry process for the removal of nitrogen oxides from flue gases, by contact catalytic reduction of NOx with ammonia, was tested both in the laboratory and under test conditions at a plant, during 1973-1974. The maximum amount of gas treated at the plant was 65 N cu m/hr. Flue gases were sent through a dust filter first, then heated, and passed through a mono-bed reactor or a multi-tube reactor. The gases were then cooled to 100-150 C, and expelled through the stack. Ammonia was automatically fed into the system at the point where flue gases left the heater. The following results were obtained for fresh catalyst: removal of rate of NOx, over 94% (SV, 10,000/H; NH3/NOx, 1.5; reaction temperature, over 300 C; removal rate of NOx, over 97% (SV, 6000/H; other conditions the same). The removal rate decreased sharply when SV was above 15,000/H. The removal rate of NOx increased with an increase in NH3/NOx, up to NH3/NOx of 1.5, where 95% NOx removal occurred. Beyond this, there was only 1-2% further increase with increase in NH3/NOx. Ammonium ion concentration increased at the reactor outlet with an increase in NH3/NOx. Durability tests on the catalyst were conducted under the following conditions: SV, 10,000/H; reaction temperature, 320-340 C; NH3/NOx, 1.5 ppm/ppm, and total amount of gas, 65 N cu m/hr. The initial removal rate of NOx was 97-98%. Catalyst activity decreased to 520 H, but from 520-900 H, activity remained nearly constant, and NOx removal rate was 84-85%. When the reaction temperature was increased to 360 C after 900 H, the NOx removal rate rose to 88%. Poisoning of catalyst by excessive amounts of sulfur oxides and secondary pollution by unreacted NH3 must be taken into account. Scale-up to 1000 N cu m/hr in 1974 is under consideration.

52915 **APTIC NO. 76887**

The Tokyo Electric Power Co., Ltd. (Japan)

ON THE DEVELOPMENT OF STACK GAS DENITRIFICATION TECHNIQUE. *(Haien dasho hijutsu no kaihatsu ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), 184-190, Feb. 1975.*

The known flue gas denitrification methods are classified and reviewed with description of reaction mechanism and characteristics. Denitrifications by the ozone oxidation absorption method and the ammonia selective reduction method were tested at pilot plants in the Minami Yokohama Power Station. In the O3 oxidation absorption method, the nitrogen oxides are oxidized to nitrogen pentoxide and absorbed in water giving nitric acid, or nitric oxide is oxidized to nitrogen dioxide and absorbed in sodium sulfite solution giving sodium nitrite. The unreacted O3 is treated with calcium sulfite and recovered as calcium sulfate. The O3 oxidation absorption system consists of an ozonizer, oxidation tower, absorption tower, and O3 recovery tower. The denitrification rate of flue gas containing 200-100 ppm of NOx was above 90%, while the denitrification rate was slightly lower in the case of NO2 absorbed in NaSO3. In the NH3 selective reduction method, NOx are reduced to nitrogen gas in the presence of a catalyst. The NH3 selective reduction system consists of an NH3 injection port, a mixer, and NOx catalytic converter. The denitrification rate of flue gas containing 90-100 ppm of NOx was above 80% at reaction temperatures of 270-350 C.

52916 **APTIC NO. 77342**

Tokyo Metropolitan Govt. (Japan), Bureau of Environmental Protection

TEST RUN REPORT BY COMBINATION OF AN IGNITION TIME CONTROL DEVICE AND A CATALYTIC DEVICE. *(Tenkajiki seigyo sochi to shokubai sochi no heiyo ni yoru jisha test kekka hokokusho). Text in Japanese. 83p., March 1975.*

The effect of the combined use of an ignition time control device and a catalytic device for automotive emission control was tested. The reduction rates for nitrogen oxides, hydrocarbons, and carbon monoxide emissions, the durability of reducing effect, safety, variation in engine performance, and emission of catalyst metals were investigated. The reduction rates at 10,000 km were 49% for CO, 33% for HC and 37% for NOx, exceeding the standards set by the Transportation Technical Council. The safety in terms of temperature elevation, and engine performance in terms of fuel consumption and accelerating power were satisfactory for practical use. The automotive exhaust emission control measures for vehicles in use compiled by the Automotive Exhaust Emission Control Committee of the Transportation Technical Council are also presented.

52917 **APTIC NO. 77375**

TECHNOLOGY FOR EXHAUST GAS DESULFURIZATION. *Japan s Oil Refin. Petrochem. Ind.), 1975:28-31, March 1975.*

A review of flue gas desulfurization technology in Japan is presented. Types of processes discussed include: catalytic oxidation and reduction, adsorption methods using activated carbon, alkaline additive processes, the Wellman Lord process, aqueous solution scrubbing, the Grillo Process, alkalized alumina processes, and magnesium oxide processes. Each process discussed is listed according to the process supplier and byproducts attainable from the process, if any. A list of main flue gas desulfurization plants in Japan (as of April 1974) is also provided.

52918 **APTIC NO. 77405**

ENVIRONMENTAL CONTROL EQUIPMENT. *Hitachi Rev. (English translation from Japanese of Hitachi Hyoron), 24(3):168-171, 1975.*

Japanese developments in air pollution control technology are reviewed. Topics discussed include: electrostatic precipitators for thermal power plants and glass melting furnaces, flue gas desulfurization processes based on wet limestone-gypsum technology, and methods for controlling emissions from industrial waste incinerators. An electrostatic precipitator designed for a 1000 MW power plant is the largest unit of its kind in Japan. A wet limestone-gypsum desulfurization plant with a capacity of 1.48 million normal cu m/hr/train is presently capable of achieving 97% desulfurization efficiency. An industrial waste incineration system that burns general refuse in a rotary kiln achieves complete combustion with the aid of a secondary combustion chamber. Secondary pollution control for the incinerator consists of a multicyclone and a venturi scrubber. The high calorie exhaust gas is utilized in a waste heat recovery boiler, and steam generated is used for production processes.

52919 **APTIC NO. 77408**

Mitsui Toatsu Chemicals, Inc. (Japan)

TECHNOLOGY FOR NOX REMOVAL. MTC PROCESS OF NOX REMOVAL. *Japan s Oil Refin. Petrochem. Ind., 1975:53-54, March 1975.*

A process developed by Mitsui Toatsu Chemicals, Incorporated for the dry removal of nitrogen oxides from stack gas is described along with some pilot plant test results. The process involves the reduction of nitric oxide and nitrogen dioxide to nitrogen and water. Ammonia is used as the reductant and is added in slight excess with respect to the NOx (NH3/NOx of 1.0-1.2). Either a low temperature catalyst (220-280 C) for sulfur dioxide-free gas or a high temperature catalyst (350-400 C) for SO2-containing gas is used in the process. Pilot plant tests indicate an NOx removal efficiency of at least 90%, with catalyst activity remaining constant after as much as 7000 hr of operation.

52920

APTIC NO. 77411

DESULFURIZATION OF FUEL OIL. *Japan s Oil Refin. Petrochem. Ind., 1975:16-20, March 1975.*

Direct and indirect hydrodesulfurization of fuel oil is discussed. Direct desulfurization involves the processing of the heavy oil itself for desulfurization and requires the use of special catalysts capable of withstanding severe reaction conditions. The degree of desulfurization, however, is very high; the sulfur content of Middle and Near East crude oils can now be lowered to about 0.5-1.2 wt%. Indirect desulfurization involves the processing of atmospheric distillate residue in a vacuum distiller to first separate vacuum distillation residues such as metals, asphalt, and heavy-grade oils. Only the vacuum distillate oil is desulfurized. It is then mixed with the separated vacuum distillation residue. The processing of oil indirectly rather than directly allows for the reaction to be carried out under easier conditions since the reaction is not affected by metals and asphalt. The consumption of hydrogen is much less and desulfurization cost is lower than for direct desulfurization. Indirect desulfurization is capable of reducing the sulfur content of Middle and Near East crude oils to about 1.5-2.5 wt%.

52921

APTIC NO. 77413

Chiyoda Chemical Engineering and Construction Co., Ltd.

ADVANCED POLLUTION CONTROL SYSTEMS IN JAPAN. FLUE GAS DESULFURIZATION TECHNOLOGY. *Japan s Oil Refin. Petrochem. Ind., 1975:38-52, March 1975.*

Advanced flue gas desulfurization systems in Japan are reviewed in terms of process description, operating variables, economics, efficiency, and by-product recovery. Processes discussed include: the Chiyoda Thoroughbred 101 Process that consists of an absorption and oxidation section followed by a crystallization section where gypsum is recovered, activated carbon adsorption processes, semi-wet desulfurization processes, lime/limestone processes which yield gypsum as a by-product, Wellman-Lord type processes, and the Fumaks and Rhodacs desulfurization and decyanization processes which are used to remove hydrogen sulfide and hydrogen cyanide from coke oven gas.

52922

APTIC NO. 77414

TODAY S TECHNOLOGIES FOR PREVENTING EMISSION OF NITROGEN OXIDES. *Japan s Oil Refin. Petrochem. Ind., 1975:21-27, March 1975.*

Technology for nitrogen oxide control from stationary sources in Japan is reviewed in terms of the state of development, process description, and NOx removal efficiency. Control techniques discussed include: firing methods (e.g., two stage combustion, reduced air supply, and shortened exposure time to high temperatures), flue gas recirculation, absorption processes, catalytic reduction processes (e.g., ammonia treatment), wet and dry adsorption processes, aqueous solution scrubbing, dry alkaline processes, and wet oxidation processes.

52923

APTIC NO. 77467

Environmental Protection Agency, Ann Arbor, Mich., Technology Assessment and Evaluation Branch

AN EVALUATION OF ROLFITE COMPANY S GASOLINE FUEL ADDITIVE UPGRADE. *Preprint, 13p., March 1975. 1 ref.*

Exhaust emissions tests with a 1970 Chevrolet Impala (350 cu in. displacement engine) were conducted by the Environmental Protection Agency to determine the effectiveness of a fuel additive known as Upgrade in increasing fuel economy and reducing exhaust emissions. Upgrade is a manganous-amine complex containing about 3 ppm manganese. The additive is soluble in gasoline and acts as a catalyst in the combustion process according to the manufacturer. The additive produced no significant changes in either exhaust emissions or fuel economy during 1600 mi of testing on the 1975 Federal Test. On the Highway Cycle test, slight decreases in hydrocarbons and carbon monoxide emissions were accompanied by a small increase in nitrogen oxide emissions, with no change in fuel economy. (Author conclusions modified)

52924

APTIC NO. 77578

THE PRESENT SITUATION AND FUTURE OUTLOOK OF THE POLLUTION PREVENTION INDUSTRY. *(Kogai boshi sangyo no genjo to tenbo). Text in Japanese. Chosa Geppo (Res. Mon. Bull., Taiyo Kobe Bank), no. 16:22-27, Jan. 1975.*

The total spent for pollution prevention equipment in 1973 was 163 million dollars, a 30% increase over the preceding year. In the past 7 years, the industry showed a 46% increase ratio. Since 1970, the production of water pollution prevention equipment has exceeded that of air pollution prevention equipment. Recently, however, desulfurization of stack gases and exhaust treatment devices have shown remarkable expansion because a nitrogen oxides emission standard was established, and standards for sulfur oxides have become more stringent. Although there are 200-300 major manufacturing enterprises, only medium-sized enterprises are exclusively engaged in the production of pollution control equipment. The number of large industries which are plant and equipment manufacturers including Mitsubishi, Hitachi, Kubota, Ishikawajima-Harima, Sumitomo, and Kawasaki, is very large.

1974

52925

APTIC NO. 77575

Etsugodani, Etsuro and Hiroo Niiyama

REMOVAL OF NITROGEN OXIDES BY CATALYSIS. *(Sankachisso no sesshoku hanno bunkai). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst. (Tokyo)), 17(5):386-391, May 1974. 46 refs.*

Studies on the catalytic decomposition of nitrogen monoxide in flue gases and automotive exhausts are described. For the catalytic oxidation of nitrogen monoxide, activated carbon impregnated with either the oxides of nickel, copper, cobalt, manganese, iron, and chromium, or ion-exchanged with 0.2-1.0% of platinum and palladium is effective. The non-selective reduction method is used to remove nitrogen oxides from the flue gas of nitric acid plants using a platinum catalyst and hydrogen or methane as reducing agents in the temperature range of 400-500 C. The selective reduction method using ammonia and hydrogen sulfide can also be used to reduce nitrogen monoxide, even in the presence of oxygen. It is comparable to the method using natural gas with respect to selectivity and cost.

52926

APTIC NO. 77571

Hishida, Kazuo

THE REACTIVITY OF HYDROCARBON VAPORS AND DEVELOPMENT OF ELIMINATION, RECOVERY, *AND TREATMENT TECHNIQUES. (Tanka suiso bepa no hannosei to bojo. kaishu, shori gijutsu no kaihatsu). Text in Japanese. Preprint, Pollution Control Technical Assoc. and CMC Center, Tokyo (Japan), 13p., 1974. (Presented at the Newest Techniques for Elimination, Recovery, and Treatment of Hydrocarbon Vapors and the Direction for Emission Control Regulations Seminar, Tokyo, Japan, May 23-24, 1974.)*

Hydrocarbons that contribute greatly to photochemical reactions are unsaturated hydrocarbons such as ethylene and acetylene, followed by aromatic hydrocarbons. Major sources of hydrocarbons are fixed ones, such as petroleum refineries, petroleum storing facilities, gas stations, printing and painting facilities, boilers, heating facilities, and moving sources such as automobiles and airplanes. Countermeasures for hydrocarbon pollution include direct fire afterburners, catalytic combustion method, adsorption method, vapor condensation method, floating roof tank, air obstructing plates, water spraying, and absorption. Hydrocarbons burn instantaneously at 700-800 C in a direct fire afterburner, with the proper amount of air. Catalytic combustion requires lower temperatures, 260-450 C, since an oxidation catalyst such as platinum is used. Vapor condensation is suitable for concentrations of more than 200 g/cu m. For a concentration of more than 10,000 ppm, a combination of condensation and adsorption is recommended.

52927 **APTIC NO. 76873**

Ishiguro, Tatsukicki

ODOR AND PUBLIC NUISANCE DUE TO COMBUSTION FACILITIES AND THE COUNTERMEASURES, NO. II. *(Nensho setsubi ni okeru akushu kogai to sono taisaku (2)). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(7):27-32, July 1974.*

The combustion method of eliminating odors is classified into two types. In one type odors are utilized as secondary air for boilers or furnaces from which hot air is discharged. In another type odor is treated by means of incineration by an independent furnace. The function of burners and types of flame, mechanisms of exhaust gas including malodorous substance mixed with flame, the resisting time and maintenance of a specific combustion temperature, and the method of heat exchange are discussed. The conduction of indirect heat exchange by ultimate exhaust gas or process exhaust gas for the purpose of retaining heat depends on the following: There must be a seal structure in which leakage of malodorous gas is reduced to zero by absorption. The furnace must be made of materials resistant to high temperature and corrosion and there must be a method of preventing deposits.

52928 **APTIC NO. 77530**

Kawaguchi, Katsuyuki, Takafumi Nakahara, Shigezane Bandai, Watao Sato, and Fumio Kandachi

NOX FORMATION IN GAS TURBINES AND ITS REDUCTION. *(Gas turbine no NOx seisei to sono teigen ni tsuite). Text in Japanese. Preprint, Gas Turbine Committee of Japan, Tokyo, p. 119-125, 1974. 4 refs. (Presented at the Gas Turbine Committee of Japan, Periodical Meeting, 2nd, Tokyo, June 1974.)*

Smoke levels and nitrogen oxide formation resulting from gas turbine operation are reviewed. The formation mechanism of NOx, conditions for low NOx combustion in gas turbines, and the reduction of the smoke level and NOx formation by the addition of water to the combustion region are discussed. The smoke level and NOx formation increased in gas turbines with an increase in the fuel-air ratio. When the ratio was 0.01, the NOx in the exhaust was about 50 ppm. Three mechanisms are possible for the formation of NOx in the combustion chamber. These include equilibrium or thermal nitric oxide, prompt NO, and fuel NO. Effective means to reduce NOx formation include: the lowering of combustion temperature, a reduction of the residence time in hot zones, and a reduction of the oxygen concentration. The addition of water to the combustion region is also effective in reducing the formation of NOx. Data are given for the reduction of NOx formation up to a water:fuel ratio of 1:1 (by weight). The merits and demerits of water addition are discussed in terms of maintenance, operation, and NOx reduction.

52929 **APTIC NO. 77562**

Knettig, P. and J. M. Beeckmans

CAPTURE OF MONODISPERSED AEROSOL PARTICLES IN A FIXED AND IN A FLUIDIZED BED. *Can. J. Chem. Eng., 52(6):703-706, Dec. 1974. 10 refs.*

The capture of monodispersed aerosol particles (0.8-2.9 micron) in a screen-supported fixed bed and in fixed and fluidized beds supported on grids of low superficial area (0.56%) was studied. All beds were composed of glass beads (425 micron mean size). Relatively high capture efficiencies were observed in the grid regions of both fixed and fluidized beds supported in this manner, with relatively lower capture efficiencies being observed in the vicinity of the screen. Aerosol capture efficiency per unit of bed volume in the body of the fixed beds was not significantly affected by the method of support and was larger than that for fluidized beds. Inertial impaction appeared to be the predominant capture mechanism under most conditions. An estimate of the aerosol capture efficiency at the grid jets which was based on an equivalent pneumatic transport line concept was in reasonable agreement with experimental observations. (Author abstract modified)

52930 **APTIC NO. 77501**

Magadeev, V. S., R. A. Petrosyan, and I. S. Kontorovich

THE INFLUENCE OF OPERATIONAL FACTORS ON THE CORROSIVITY OF THE PRODUCTS OF COMBUSTION OF HIGH-SULPHUR OIL. *Thermal Eng. (English translation from Russian of: Teploenergetika), 21(9):64-66, 1974. 3 refs.*

The influence of operational factors on the corrosivity of the products of combustion of high-sulfur oil was investigated in a TM-84 boiler. Measurement of the corrosivity of the furnace gases with different extents of fouling of the heating surfaces show that regardless of the extent of fouling, an important factor in the process of formation of sulfur trioxide is the boiler load. The main conditions required to reduce the corrosivity of the products of combustion of high S oil are burning the fuel with low excess air and reducing the temperature in the zone of the reaction in which SO3 is formed, i.e., in the tail end sections of the flame. Low temperature combustion conditions in the furnace chamber enable high S oil to be burned with moderate excess air at the furnace exit, equal to 5-7%, which considerably eases operation of boilers burning oil.

52931 **APTIC NO. 77459**

Nizhegorodtsev, V. I. and N. V. Kel tsev

USE OF SURFACTANTS DURING ARSENIC-SODA DESULFURIZATION. *(Primenenie poverkhnostno-aktivnykh veshchestv v protsesse mysh yakovo-sodovoy seroochistki). Text in Russian. Trudy Mosk. Khim.-Tekhnol. Inst., no 79:52-54, 1974. 8 refs.*

The use of alkylphosphate surfactants in the acid-soda process for the removal of hydrogen sulfide from gases in petrochemical plants was studied in a scaled-down laboratory model and in a full-scale plant. The alkylphosphate surfactant, added at a rate of 10-30 mg/liter in the laboratory model, and at a rate of 1 g/1000 N cu m in the full-scale plant, intensified foaming and flotation of sulfur in the regenerators, and increased the retention of dust, tar, and oil from the gas and then from the scrubbing solution.

52932 **APTIC NO. 76795**

Okuda, T., K. Hieda, R. Shibata, and T. Nakajima

CAUSE OF COMBUSTION DAMAGE OF ELECTRIC DUST COLLECTORS FOR SINTERING MACHINES

AND ITS COUNTERMEASURE. (Shoketsu shuaikiyo denki shujinki no shoson jiko no genin to sono taisaku ni tsuite). Text in Japanese. Preprint, Iron and Steel Inst. of Japan, Tokyo, p 26, 1974. (Presented at the Iron and Steel Inst. of Japan, Annual Meeting, 88th, Osaka, Japan, Nov. 3-5, 1974, Paper 26.)

The causes of breakdown in electrostatic precipitators for sintering flue gas treatment were examined by analyzing the collected dusts. Both differential thermal analysis (DTA) and thermal gravimetric analysis (TGA) were performed and vaporized gases were analyzed by mass spectrometry. The DTA showed an endothermic reaction from 130 C, which was attributed to the liberation of water from the dusts, and a second endothermic reaction was observed between 150 C to 240 C which was the region in which methane, ammonia, hydrogen chloride, and ethylene were liberated from the dust. No combustion occurred at temperatures below 240 C; however, an exothermic reaction occurred when the temperature was higher than 240 C, which was attributed to the combustion of vaporized components. The heat generated upon the combustion caused the breakdown of electrostatic precipitators. Therefore, the precipitator should be kept at temperatures below 240 C at which the combustion of vaporized components does not occur; however, any spark within the electrostatic precipitator would cause combustion even at temperatures below 240 C. The control of temperatures in electrostatic precipitators, as well as spark and oxygen concentration within the precipitator, are necessary to avoid precipitator breakdown.

52933 **APTIC NO. 77559**

Parker, D. A. and M. Kendrick

A CAMSHAFT WITH VARIABLE LIFT-ROTATION CHARACTERISTICS; THEORETICAL PROPERTIES AND APPLICATION TO THE VALVE GEAR OF A MULTICYLINDER PISTON ENGINE. *Preprint, Societe des Ingenieurs de l Automobile, Paris (France), p. 224-232, 1974. 4 refs. (Presented at the Congres International FISITA, 15th, Paris, France, May 13-17, 1974, Paper B-1-11.)*

A camshaft in which the effective cam shape is determined by the transmission properties of a mechanism interposed between the driving shaft and each driven cam is described. This mechanism included an intermediate member whose axis of rotation is displaced from the axis of the shaft. The camshaft properties were varied by rotating the axis of the intermediate member around that of the shaft by means of a geared control shaft. A kinematic analysis confirmed by valve lift measurements showed that the effective width of a typical cam could be varied over a range of 60 deg and the point of maximum lift over a range of 34 deg, both angles measured at the crankshaft. Variable camshafts of this design were fitted into the standard camshaft spaces of a Fiat 1438 cu m OHC engine and ran for an extended period with little deterioration. Optimization of the camshaft settings at each speed was made possible by an automatic control system and led to substantial improvements in torque and fuel consumption. The settings corresponding to the greatest increases in torque also provided significant reductions in hydrocarbon and carbon monoxide emissions by promoting more complete combustion.

52934 **APTIC NO. 76832**

Pichard, J. and M. Gratadour

VARIABLE BALLISTIC DISTRIBUTION FOR BVT SYSTEM INTERNAL COMBUSTION ENGINES. *(Distribution balastique variable pour moteur a combustion interne - systeme BVT). Text in French. Preprint, Societe des Ingenieurs de l Automobile, Paris (France), p. 193-200, 1974. 6 refs. (Presented at the Congres International FISITA, 15th, Paris, France, May 13-17, 1974, Paper B-1-6.)*

The design, performance, and exhaust emissions of the BVT variable fuel distribution system in spark ignition and diesel engines are described. The variable distribution system permits the increase of the valve lift with increasing engine speed and an increase in the closing valve of the valve. Consequently, admission and exhaust cams with variable closure are obtained. Road tests of spark ignition engines equipped with the variable distribution system revealed fuel economy, increased flexibility for different load conditions, and increased power output. Emission of hydrocarbon and carbon monoxide were reduced by 30-50%, resulting from the exhaust gas recirculation, increased turbulence at admission, and improved heating of the mixture in the admission chamber. Exhaust gas recirculation also reduced the oxides of nitrogen emission. In diesel engines, the increased air-fuel ratio under full load reduced unburned hydrocarbon and oxides of nitrogen emissions.

52935 **APTIC NO. 77393**

Potapov, O. P. and E. D. Finger

IMPROVEMENT OF THE METHODS OF DETERMINATION OF THE EFFICIENCY OF ASH COLLECTION IN BOILER PLANTS WITH INDIVIDUAL SYSTEMS OF PULVERIZED FUEL PREPARATION. *Thermal Eng. (English translation from Russian of: Teploenergetika), 21(9):126-128, 1974. 2 refs.*

Methods for the determination of the efficiency of ash collection in boiler plants with individual systems of pulverized fuel preparation are calculated. A formula was developed for calculating the overall efficiency of ash collection and the efficiency of ash collecting itself in boiler plants with open type systems of pulverized fuel preparation. For boiler plants with open type systems of pulverized fuel preparation and use of a part of the flue gases for drying the fuel, formulas were calculated for determining the efficiency of the scrubber for the coefficient of slag collection of the furnace. (Author conclusions modified)

52936 **APTIC NO. 77450**

Powell, D. J. and D. E. Hasselmann

RELIABILITY OBSERVATIONS AND EMISSION MEASUREMENTS AT GASOLINE TRANSFER VAPOR RECOVERY SYSTEMS. *TRW, Inc., Redondo Beach, Calif., Transportation and Environmental Operations, Environmental Protection Agency Contract 68-02-0235, 34p., Nov. 1974.*

A 5 wk study was performed to assess the reliability of vapor control systems at gasoline service stations and to measure gasoline vapor concentrations at various emission points of the systems. The study consisted of random and unannounced inspections of gasoline vapor recovery devices at filling stations in the San Diego area. Five secondary vapor recovery systems were reviewed at 23 locations, as well as two displacement (balanced) vapor recovery systems. The 23 vacuum assisted vapor recovery systems were inoperative 5.4% of the time during the test period. Most of the breakdowns were the result of the failure of a small high speed blower belt. Several of the vapor recovery units were found to have vapor leaks which would significantly lower their efficiency. Appreciable leakage was noted at the nozzle-filler neck interface with all systems. The major causes of this leakage appeared to be the lack of a tight seal at the nozzle-filler neck interface, or insufficient applied vacuum to compensate for the pressure buildup in the vehicle tank caused by the liquid flowing into it. A number of potential fire and safety hazards were noted during the test period. Requirement of flame and waterproof circuitry, pressure tested piping, and specific foundation material would remedy most of the deficiencies. (Author abstract modified)

52937 **APTIC NO. 77574**

Saeki, Kenji

EXAMPLES OF HYDROCARBON VAPOR TREATMENT BY THE COMPLIMO METHOD OF COMBUSTION. *(Konpurimo hoshiki no nenshoho ni yoru tanka suiso bepa shori no jissai). Text in Japanese. Preprint, Pollution Control Technical Assoc. and CMC Center, Tokyo (Japan),* *16p., 1974. (Presented at the Newest Techniques for Elimination, Recovery, and Treatment of Hydrocarbon Vapors and the Direction for Emission Control Regulations Seminar, Tokyo, Japan, May 23-24, 1974.)*

The characteristics of the direct-fire combustion method by Complimo (Holland) include: low initial cost because no catalysts are required; use for combustible compounds other than hydrocarbons; no special attention required for dust. However, the fuel cost is high since high temperature must be maintained. A blower is necessary because it employs forced ventilation. The catalytic oxidation method has the following characteristics: low fuel consumption and nitrogen oxides emissions due to low combustion temperature; minimum fuel consumption due to the recovery of combustion heat. Catalytic oxidation requires special attention for dusts, which can reduce the life of the catalyst. The catalyst used in this particular case is a KEC oxidation catalyst, which contains 0.05% to 0.1% platinum. The height of the catalytic layer is usually 40 to 80 mm, and the catalytic area is dependent on the quantity of gas. The catalyst gives highest performance at 200 C to 450 C. Gas from an animal waste treatment plant with a hydrocarbon concentration of 394 ppm, a formaldehyde concentration of 171 ppm, and an acetaldehyde concentration of 97 ppm was successfully treated with the catalyst at more than 90% efficiency.

52938 **APTIC NO. 76814**

Sakurada, Toshio

A FLUE GAS DESULFURIZATION PROCESS. *(Haien datsuryu setsubi). Text in Japanese. Tekkokai (Iron Steel Ind.), 24(4):69-73, April 1974.*

A wet type CAL flue gas desulfurization process developed by the Kobe Steel Co. which has been operating experimentally in a 50,000 N cu m/hr medium-size plant at the sintering furnace of the Kakogawa iron mill. The process was designed to enable flue gas containing sulfur oxides to come in contact with an absorption liquid (CAL liquid) composed of a 20-30 wt% aqueous solution of calcium chloride to which some slaked lime is added in order to remove sulfur oxides, and to obtain calcium sulfite or gypsum in the solid state as a by-product. The flue gas is introduced into an acid tower where its humidity and temperature are controlled, and it undergoes humidification with a 3% calcium chloride aqueous solution. The temperature and humidity are controlled with a 20-30% wt% calcium chloride solution. The gas in introduced into an alkali tower, where the concentration of sulfur oxides is reduced to less than 50 ppm by an alkaline solution composed of about 20-30% wt% calcium chloride and 0.3-0.4 wt% slaked lime. Calcium sulfite formed and concentrated to a cake with about 20-40 wt% moisture which is, in turn, oxidized by air under 3-5 kg/sq cm, to form gypsum.

52939 **APTIC NO. 77412**

Sale, B. and Y. Breelle

NEW PROPULSION SYSTEMS FOR VEHICLES IN URBAN TRAFFIC. *(Les nouveaux systemes de propulsion envisageables pour les vehicules urbains). Text in French. Rev. Inst. Franc. Petrole, 29(6):901-915, Nov.-Dec. 1974. 11 refs.*

Alternate propulsion systems for reducing exhaust emissions from motor vehicles in urban traffic are reviewed. Both thermomechanical and electrochemical propulsion systems are considered. Developments in thermomechanical propulsion systems reviewed include: catalytic converters, stratified charge engines, diesel engines, external combustion engines, stirling cycle engines, and gas turbines. Electrochemical propulsion systems discussed include: the sodium-sulfur storage battery, the zinc-air fuel cell, and the hydrogen-air fuel cell. The last of these is seen as playing a prominent future role in motor vehicle propulsion since hydrogen is anticipated to be an important chemical vector for nuclear energy production and electricity storage.

52940 **APTIC NO. 77458**

Samoylenko, G. E., Z. V. Vorontsova, and L. G. Gerasimenko

EFFECT OF A SKELETAL IRON CATALYST ON THE LOWERING OF THE SULFUR CONTENT IN COAL BEING CONVERTED TO COKE. *(Vliyanie skeletnogo zheleznogo katalizatora na umen shenie soderzhaniya sery v koksuyushchikhsya uglyakh). Text in Russian. Metall. Koksokhim. Resp. Mezhved. Nauch.-Tekh. Sb., no 37:35-39, 1974. 3 refs.*

A skeletal iron catalyst in hydrogenated form was found to be suitable for the reduction of the sulfur content in coal during its conversion into coke, and to replace the more expensive nickel catalyst. To reduce the sulfur content, crushed coal is combined with a skeletal iron catalyst at rates of 5 to 20% for heat treatment between 250-300 C before coking. The residual sulfur content in the coke decreases with increasing catalyst expenditure. The hydrogen present in the catalyst is used up almost quantitatively for hydrogen sulfide formation at temperatures below 250 C.

52941 **APTIC NO. 76871**

Sano, Hiroshi

EXHAUST GAS DESULFURIZATION BY MEANS OF SPRAYING EMULSIFIED MAGNESIA. *(Nyuka maguneshia fukikomi-shiki haien datsuryu). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 10(6):1855-1857, June 1974. 5 refs.*

Results obtained from exhaust gas desulfurization using fatty acid magnesium as a neutralizing reagent are presented. Four original neutralizing reagents of a concentration less than a respective saturated one were prepared. A-type heavy oil of 0.5 sulfur content was used primarily. When using formic acid, the magnesium g volume necessary for desulfurization increased with an increase in the sulfur content of the fuel oil. A-type neutralizing reagent was distributed in nearly the same linear fashion as B-type. Since magnesium salt has a high solubility, it can be used with fuel oil of high sulfur content (40-50 g/l). In some cases, however, an accumulation of ashes or blockading frequently occurs if the volume of magnesium salt added is increased. Exhaust gas desulfurization by means of emulsified magnesium, compared with that of calcium, is capable of increasing combustion heat efficiency.

52942 **APTIC NO. 76756**

Sato, Go, Osamu Kawaguchi, and Seiji Achinami

STUDIES ON THE REDUCTION OF NOX IN CONTINUOUS INCINERATORS. *(Renzokushiki nenshoki ni okeru NOx gensho taisaku no kenkyu). Text in Japanese. Preprint, Gas Turbine Committee of Japan, Tokyo, p. 127-130, 1974. 3 refs. (Presented at the Gas Turbine Committee of Japan, Periodical Meeting, 2nd, Tokyo, June 1974.)*

Studies on the flow of fuel before combustion, the state of combustion, the temperature distribution in the combustion chamber, the concentration distribution of nitric oxide, nitrogen oxides, and carbon monoxide in the chamber, and the concentration of these in incinerator exhaust gas were performed. The state of combustion varied largely with the supply of air. As the amount of primary air increased, the flame elongated and extended out of the combustion chamber. A decrease in the air-fuel ratio promoted combustion due to evaporation on the wall. Trends for temperature distribution in the combustion chamber were similar to those for the concentration distribution of NO and NOx. When the amount of primary air was little, the CO content of the exhaust gas tended to decrease with an increase in the air-fuel ratio. Also, NO and NO2 emissions decreased as the amount of primary air was decreased. The incinerator used for the study was a specially designed one; liquid fuels were injected through a spiral nozzle onto the wall of the combustion chamber to form a liquid film on the wall. This liquid film was evaporated by the heat conduction of the burning gas.

52943 **APTIC NO. 76804**

Sawa, N. and S. Hori

STUDY OF THE COMBUSTION CHARACTERISTICS OF THE METHANOL ENGINE. *(Metanoru kikan no nensho tokusei ni kansuru kenkyu). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 339-344, 1974. 2 refs. (Presented at the Japan Society of Mechanical Engineers Yamanashi Branch Lecture Meeting, Yamanashi, Japan, Nov. 16, 1974.)*

An experiment using wet methanol as fuel for a water-cooled four- cycle engine was conducted to determine its efficiency and the properties of its waste gases. Methanol has many advantages such as the economical use of petroleum gas and the removal of air pollution. Sufficient heating of the suction tube containing methanol and water is necessary to prevent the deterioration of the lubricants and a drop in engine power. The methanol engine had 1.17 times as much power as the gasoline engine under the same operating conditions. At increased concentrations of methanol gas in the engine tube the carbon monoxide concentration in the waste gas is lower than in the gasoline engine. The nitrogen oxides in the heating engine tube decrease as the water in CH3OH increased. The NOx concentration in the non-heating engine tube gave the same results in both the gasoline engine and the CH3OH engine.

52944 **APTIC NO. 77488**

Schweitzer, P. H.

TOWARD AN ECONOMICAL LOW POLLUTION AUTOMOBILE. *Preprint, Societe des Ingenieurs de l Automobile, Paris (France), p. 201-208, 1974. 44 refs. (Presented at the Congres International FISITA 15th, Paris, France, May 13-17, 1974, Paper B-1-7.)*

A proposal for the early development of an economical low pollution automobile that is based on the conventional reciprocating spark ignition engine is discussed. Only relatively minor modifications are added, the technology for which is already available. Closed-loop electronic control of spark-timing and air-fuel ratio insures optimum fuel economy while meeting the U. S. emissions standards set for 1975 and 1976. In addition, it would reduce fuel consumption about 8% compared to non-controlled automobiles, and 30% compared with favored emission controls proposed for 1975 and 1976.

52945 **APTIC NO. 77448**

Sudar, S. and L. Grantham

DIESEL EXHAUST EMISSION CONTROL PROGRAM: FINAL REPORT. *Atomics International, Canoga Park, Calif., Dept. of Transportation Contract CA-06-0035, Rept. AI-73-61 and UMTA-CA-06-0035-74-1, 105p., Jan. 1974. 6 refs.*

NTIS: PB 234-752

The development and demonstration of a prototype diesel engine exhaust emission control system for urban buses is described. The system design concept is based upon catalytic oxidation of hydrocarbons, carbon monoxide, and odorous oxygenated organic compounds. Removal of nitrogen oxides (NOx) is based upon catalytic oxidation of nitric oxide to nitrogen dioxide (NO2) and subsequent absorption of NO2 in an alkaline molten carbonate salt scrubber. The system was demonstrated in a city bus. The California 1975 heavy-duty vehicle standards were attained except for reduction of NOx. To meet future California requirements of less than 5 gm/B-Hp-Hr of combined hydrocarbons and NOx, larger residence times are required. The resulting muffler size may not be compatible with bus installation constraints. Advantages and disadvantages of the diesel exhaust emission control system are discussed. (Author abstract modified)

52946 **APTIC NO. 77461**

Sushchev, V. S., A. G. Amelin, and S. G. Tibilov

EFFECT OF VARIOUS PARAMETERS OF AN ACID-CATALYTIC PROCESS ON THE DEGREE OF ABSORPTION OF SULFUR DIOXIDE. *(Issledovanie vliyaniya razlichnykh kislotnokataliticheskikh parametrov na stepen absorptsii sernistogo angidrida). Text in Russian. Trudy Mosk. Khim.-Tekhnol. Inst., no 79:89-92, 1974. 7 refs.*

The effect of temperature, sulfur dioxide concentration, sulfuric acid concentration, and manganese ion concentration on the degree of SO2 absorption by acid-catalytic process was studied experimentally by regression analysis. Sulfur dioxide was absorbed in sulfuric acid solution with manganese sulfate corresponding to a manganese concentration of 0.02-0.08 wt%. The rate of absorption increased with temperature in a range of 10-70 C, and it decreased with increasing sulfuric acid concentration in a range of 10-20%. The absorption rate also decreased with increasing SO2 concentration in the gas to be cleaned in a range of 0.1-0.9 vol%.

52947 **APTIC NO. 77529**

Terada, Hiroshi

EXAMPLES OF HYDROCARBON VAPOR ADSORPTION TREATMENT SYSTEMS. *(Tanka suiso bepa o taisho to shita baai no kyuchaku shori sochi no jissai). Text in Japanese. Preprint, Pollution Control Technical Assoc. and CMC Center, Tokyo (Japan), 17p., 1974. (Presented at the Newest Techniques for Elimination, Recovery, and Treatment of Hydrocarbon Vapors and the Direction for Emission Control Regulations Seminar Tokyo, Japan, May 23-24, 1974.)*

The characteristics of a good adsorbent include: high adsorbing power and good retention easy desorption upon regeneration; high adsorption at low temperatures; high selectivity when there is water vapor chemically stable and low catalytic action; high mechanical and thermal strength; and low ventilation resistance. The most commonly-used adsorbents are activated carbon, silica gel, alumina gel and the molecular sieve. Activated carbon has a high specific surface area of 800 to 1800 sq m/g while that of silica gel is 200 to 600 sq m/g. There are two major apparatus for adsorption, the single-layered batch type and the continuous type. The latter is further classified into a fixed bed, a moving bed, and fluidized bed. An adsorbing apparatus consists of an adsorbing tower, a condenser, a decanter, and distilling tower. Factors to be considered when designing an adsorbing apparatus include. Gas-treating capacity; gas temperature; gas composition; utility conditions such as water temperature and pressure, steam pressure and electricity, and location.

52948 **APTIC NO. 76776**

Tsuji, M., T. Okuno, T. Yamazaki, and K. Shintani

ON THE ACTIVATED CARBON ADSORPTION OF SULFUR COMPOUNDS. *(Iou kagobutsu no kasseitan kyuchaku ni tsuite). Text in Japanese. Hyogo-ken Kogai Kenkyusho Kenkyu Hokoku (Rep. Environ. Sci. Inst. Hyogo Prefect.), no. 6:43-46, 1974. 6 refs.*

The deodorization of malodor in leather processing plants by means of adsorption on activated carbon was investigated by adsorption tests using standard gas and measuring deodorization effects for malodorous gas produced by actual leather processing. The adsorption apparatus consists of two adsorption towers each packed with 20 kg of activated carbon, in which the flow rate of gas is regulated by four butterfly dampers. The removal rates measured by varying the linear velocity of gas flow were 99.90-99.97% (high concentration gas) and 99.60-99.98% (low concentration gas) for hydrogen sulfide, 100% for methyl mercaptan, and 50.00-99.68% for dimethyl sulfide which varied greatly with linear velocity. The H2S concentration measured for each process of leather processing were approximately 10 ppm for deliming, 40-660 ppm for pickling, and 10-350 ppm for chrome tanning. The methyl mercaptan concentration was increased markedly at deliming, reaching 79 ppb. Dimethyl sulfide increased gradually up to the deliming stage, followed by a gradual decrease. The actual removal rates of each malodorant produced during leather processing could not be measured due to the low concentration of malodorant produced. However, the removal rate of H2S measured at high concentration was above 95%.

52949 **APTIC NO. 77529**

Uwakawa, Sumi

EXAMPLES OF GASOLINE VAPOR CONDENSATION RECOVERY SYSTEMS AT GASOLINE STATIONS AND PETROLEUM STORAGE TANKS. *(Kyuyusho, yusosho ni okeru gasorin bepa no gyoshuku kaishu sochi no jissai). Text in Japanese. Preprint, Pollution Control Technical Assoc. and CMC Center, Tokyo (Japan), 14p., 1974. (Presented at the Newest Techniques for Elimination, Recovery, and Treatment of Hydrocarbon Vapors and the Direction for Emission Control Regulations Seminar, Tokyo, Japan, May 23-24, 1974.)*

Two types of vapor recovery apparatus, Vapotrol VS-1 for a gas station and the Vaporex unit for gasoline storage are described. The Vapotrol VS-1 condenses excess gasoline due to an imbalance during the transfer of gasoline. When gasoline is put into the gas tank the gasoline vapor is returned to an underground tank in the gas station. The temperature difference between the automobile gas tank and the underground gas tank creates an imbalance of vapor between the two. A cooler is used to condense the excess gas vapor which is then returned to the underground tank. No vapor is lost due to the completely closed system. The system is safe, no activated carbon is required, and the structure is compact. The Vaporex is composed of compressor cooler, and recovery units. Vapor from the gas tank is mixed with the coolant and the mixture is introduced in a pre-saturator. The vapor then passes through a de-mister and is compressed in the compressor. The compressed vapor is condensed in the condensing tower. About 90% of the vapor is condensed and recovered. Further recovery can be achieved by using an adsorbing tower. The characteristics of this system are: high efficiency; high safety; and automatic, continuous operation.

52950 **APTIC NO. 77472**

Yamagishi, Kazuo, Masaaki Nozawa, Terukazu Yoshie, Tsunenori Tokumoto, and Yasuo Kakegawa

A STUDY OF LOW NOX COMBUSTION. *Bull. JSME (Japan Soc. Mech. Engrs.), 17(112):1305-1312, Oct. 1974. 10 refs.*

A natural gas-fired combustion method for decreasing nitrogen oxide emissions is described. The combustion is divided into a primary and secondary phase, with about 50-60% of the stoichiometric air being supplied to the primary combustion chamber to complete the partial combustion. Compounds such as hydrogen cyanide and ammonia which are formed in the primary combustion region are converted to NOx via secondary combustion at the rate of about 80%. The completely premixed partial combustion is effective in decreasing HCN and NH3 and thus reduces the overall emission level of NOx. The use of a catalyst in the primary combustion chamber to suppress the formation of the above nitrogen compounds results in a 38% decrement in NOx formation. (Author abstract modified)

52951 **APTIC NO. 76757**

Japan Automobile Research Inst., Inc.

AUTOMOBILE ENGINES DRIVEN BY METHANOL AND WATER. *(Mesanol-Mizu nenryo jidosha-yo kikan). Text in Japanese. Nippon Jidosha Kenkyujo Kenkyu Sokoku (Res. Lett. Japan Automob. Inst.), no. 8:1-27, Jan. 1974. 7 refs.*

Experimental studies on the performance, exhaust gas, and endurance of engines driven by a mixture of methanol and water as fuel were performed. The effects of the percentage of water, air-fuel ratio, and the ignition angle on the output and the exhaust gas were examined. An actual car was constructed with the engine, and tests were made on the running performance, gas discharge, and endurance. The waste gas discharged from the car was purified by an oxidation catalyst. The gas discharge contained 0.87 g/km of carbon monoxide, 0.21 g/km of hydrocarbons, and 0.17 g/km of nitrogen oxides. After a running test of about 10,000 km, the engine was dismantled. Wear of the main bearing and the valve seat was much less than that found in gasoline engines.

52952 **APTIC NO. 76851**

Combustion Power Co., Inc., Menlo Park, Calif.

ENERGY CONVERSION FROM COAL UTILIZING CPU-400 TECHNOLOGY (INTERIM REPORT). *Office of Coal Research Contract 14-32-0001-1536, Rept. TR-74-105, OCR/R and D 94/Int. 1, 130p., Nov. 1974.*

NTIS: PB 237028

Emissions tests on a pressurized fluidized bed combustor operating at various coal/dolomite ratios were performed. The system also included three inertial separator stages, 1-megawatt gas turbine, and system instrumentation with computer controls. An extended run at 1600 F bed temperature, a calcium/sulfur mole ratio of 1.5, a bed velocity of 7 ft/sec, and an excess air of 135%, using Illinois number 6 coal (4% sulfur) provided average sulfur dioxide and nitrogen dioxide (reported as nitrogen oxides) emissions of 0.76 lb/million Btu and 0.68 lb/million Btu, respectively, which were below the Environmental Protection Agency standards of 1.0 and 0.7 lb/million Btu for SO2 and NO2, respectively. Subsequent runs on the combustor configuration established that all components were operable in the combustion of coal and that immediate attention needs to be directed toward the removal of particulate matter prior to turbine input. (Author abstract modified)

52953 **APTIC NO. 77452**

Sobotka and Co., Inc., Stamford, Conn.

POLICY GUIDELINES FOR AUTOMOBILE EMISSIONS CONTROL: A REVIEW OF THE STUDY ON AIR QUALITY AND AUTOMOBILE EMISSION CONTROL BY THE NATIONAL ACADEMY OF SCIENCES (FINAL REPORT). *Dept. of Transportation Contract PS-50219, Rept. DOT-S-75-1, 10p., Nov. 1974.*

NTIS: PB 238 510

The benefits and costs of controlling automobile pollution are large. The large potential benefits justify development of a program for rigorously controlling automobile-caused pollution. The large potential costs imply the program should be carefully structured to assure cost minimization, so as to conserve resources and to make such a program more acceptable. The level and timing of the current nitrogen oxides standards are questionable. Both should probably be relaxed. The cost savings from doing so are substantial. A single national standard for automobile emissions is unjustified. A preferable policy would allow two or even more standards depending on the severity of the problem. Local implementation modeled on the State Implementation Plans for stationary sources seems preferable to national auto emission regulations. Ambient air quality standards are set at the Federal level. These standards can be achieved in the least costly manner by taking advantage of the potential trade-offs between automobile emissions, auto use limitations and control of emissions from stationary sources. These trade-offs can only be made if local conditions are considered. (Author abstract)

1973

52954 **APTIC NO. 77457**

Belyshev, A. K., N. S. Dakhis, E. M. Milyukova, L. A. Tarabrina, and B. S. Oleynik

IMPROVEMENT OF LIMESTONE PREPARATION TECHNOLOGY FOR SULFUR DIOXIDE ADSORPTION. *(Sovershenstvovanie tekhnologii podgotovki izvestnyaka dlya ulavlivaniya sery). Text in Russian. Bezop. Tr. v Prom.), no. 6:57-58, 1973.*

An improved method for limestone preparation for sulfur dioxide adsorption in an iron ore dressing plant is described. The limestone fraction below 40 microns was found to be most active in SO2 adsorption, as shown by a high utilization index. To obtain limestone in this fraction, the limestone ground in a ball mill is sent to hydrocyclones for preliminary classification, from which the coarse fraction is returned to the mill. The slaked lime from the second-stage hydrocyclones has the optimal particle fraction for SO2 adsorption.

52955 **APTIC NO. 76826**

Kaneko, Y., H. Kobayashi, R. Komagome, M. Kawagoe, and K. Koga

THE EFFECT OF EXHAUST GAS RECIRCULATION AND RESIDUAL GAS ON ENGINE EMISSIONS AND PERFORMANCE. *(Jidosha yo kikan no haiki gasu to seino ni oyobosu haigasu saijunkan to zanryu gasu no eikyo). Text in Japanese. Mitsubishi Juko Giho (Mitsubishi Heavy Ind. Tech. Rev.), 10(5):673-683, 1973. 4 refs.*

The effect of exhaust gas recirculation and residual gas on engine emission and performance was investigated using spherical and discoidal combustion vessels and a single cylinder engine. In the engine test, the effects of EGR and engine modification with improved valve timing were compared. A description of experimental apparatus and procedures are given with flow sheets. The nitrogen oxides concentration measured by varying the ratio of fuel, oxygen, and nitrogen indicated that the predominant factors for nitric oxide formation are O2 and N2 concentrations in combustion gas and combustion temperature. In the case of adding carbon dioxide to lower combustion temperature, the reduction rate in NOx concentration decreases with increases in the amount of CO2 added. The total amount of EGR can be obtained by measuring CO2 concentration during the compression process prior to the ignition. The reduction in NO formation by internal EGR and external EGR are about the same when CO2 concentration is constant. The hydrocarbons increased with increase in external EGR and decreased in the case of internal EGR. The carbon monoxide is unaffected by the amount of EGR, and is dependent on the air-fuel ratio.

52956 **APTIC NO. 76839**

Tsuda, M., T. Funakoshi, H. Nagano, T. Yamamoto, and M. Hirao

CATALYTIC OXIDATION PROCESS FOR DEODORIZATION. *(Shokubai nensho ho ni yoru dashu gijutsu no kaihatsu kenkyu). Text in Japanese. Mitubishi Juko Giho (Mitsubishi Heavy Ind. Tech. Rev.), 10(5):691-696, 1973. 5 refs.*

The known deodorization methods are classified and a brief description of each method is given. The catalytic oxidation method, in which the malodorants are converted into harmless substances such as carbon dioxide, water, and nitrogen at relatively low temperature (250-350 C) in the presence of catalyst, is reviewed with its advantages and disadvantages. Several commercial catalysts for oxidation deodorization containing platinum, palladium, nickel, copper oxide, chromium oxides, and manganese oxide were tested in terms of catalytic activity and durability. The specification of catalyst (chemical composition, carrier, shape, size) and experimental results on conversion rate and durability tested using air samples containing n-hexane and exhaust gas from a paint coating plant are given with a description of the experimental apparatus and procedures. The Pt-alumina catalyst was most effective. The basic data for designing catalytic combustion systems concerning operative conditions of the catalyst bed (type of catalyst, inlet temperature of catalyst bed, S. V. value, and linear velocity in catalyst bed) are given. The calculation method for design factors, mass balance of the system, and running cost are also discussed.

52957 **APTIC NO. 77435**

Nissan Motor Co., Ltd. (Japan), Dept. of Public Relations

AIR POLLUTION AND AUTOMOBILES: QUESTIONS AND ANSWERS FOR EXHAUST GAS. *(Taiki osen to jidosha: Haishutsu gasu ni kansuru Q and S). Text in Japanese. 147p., Feb. 1973.*

The present status of air pollution problems and automotive exhaust emission control measures taken by Nissan Motor Co. are reviewed. The subjects discussed are air pollution and its causes (pollutants, smog in London, Los Angeles, Tokyo), air pollution control administration (governmental agencies, public research institutions, budgets, environmental standards), air pollution measurement (measurement methods, instruments, monitoring), and automotive exhausts (types of exhaust gas, effects of automotive exhausts on the human body, pollution by automotive exhausts, emission control standards, emission control measures, measurement methods and instruments for automotive exhausts, fuels). Also reviewed are the development of new types of motors (rotary engines, electric cars, gas turbine engines, vapor engines, fuel batteries, hybrid engines), automotive emission control measures taken by the Nissan Motor Co., and the future of pollution problems and automobiles.

1972

52958 **APTIC NO. 77464**

Andon ev, S. M., O. V. Filip ev, and A. M. Pochtman

NOXIOUS EMISSIONS FROM FERROUS-METALLURGY UNITS AND WAYS OF REDUCING THEM. *(Vrednye vybrosy ot agregatov chernoy metallurgii i puti ikh sokrashcheniya). Text in Russian. Ochistka Vod. Vozdush. Basseinov Predpr. Chem. Met., no. 1:3-18, 1972.*

An inventory of the gaseous and particulate emissions in ferrous metallurgy, and methods for the control of such emissions are described. Dust, sulfur dioxide, and carbon monoxide are the principal pollutants emitted by metallurgical plants. The emissions from ore-dressing plants can be controlled by the elimination of fine fractions, and by reducing fuel consumption through air preheating. Carbon monoxide can be oxidized by the contact method or by additional fuel. The dust content in blast-furnace gas can be reduced to 10 mg/cu m by adequate dust separators. An optimized blow system with improved blow tuyere design is essential for dust abatement in open hearth furnaces. The converter emissions can be reduced by using enriched ore, by reducing the sulfur and silicon content in the cast iron, and by improving the blow process. The use of dust-free charge and dry quenching are most effective in controlling dust emissions from coking plants. Both dust and SO2 emissions can be controlled most efficiently by using gaseous fuel in the ceramics industry.

52959 **APTIC NO. 76853**

Hopper, W. C.

THE PROBLEM OF GASOLINE ENGINE EXHAUST CONTROL. *Stichting CONCAWE, The Hague (Netherlands), Special Task Force on Gasoline Engine Exhaust Control, Rept. 12/72, 101p., Dec. 1972. 48 refs.*

The reduction of exhaust emissions from gasoline engines is discussed. The effects of gasoline composition and fuel additives, engine design and operation modification, and thermal and catalytic afterburners on exhaust composition are reviewed. Large reductions in hydrocarbons and carbon monoxide emissions from new vehicles (up to 70 or 80%) are possible using relatively minor engine design changes and without fuel modification. Nitrogen oxide reductions of up to 50% can be achieved in the same manner. Lead emissions can be reduced to some extent by restricting fuel lead content, though a rapid reduction in gasoline lead content is not feasible because of the high cost and refining, distribution, and supply problems. The addition of aromatic components to gasoline appears to have only a small effect on the polynuclear aromatic emissions. Vehicular exhaust emission legislation and vehicle test cycles are reviewed for several European countries and the United States.

52960 **APTIC NO. 77456**

Sergeev, V. V., A. M. Mironov, N. A. Kholmovskaya, V. F. Shirokova, and V. G. Tishkina

ABSORPTION OF HYDROGEN CHLORIDE AND CARBON DIOXIDE FROM GASES OF MAGNESIUM PRODUCTION BY CHLORINATED SOLUTIONS. *(Absorptsiya khloristogo vodoroda i uglekislogo gaza iz nizkokontsentrirovannykh gazov khlorirovannymi rastvorami). Text in Russian. Tr. Vses. Nauch.-Issled. Proektn. Inst. Alyum. Magn. Elektrod. Promsti., no. 83:126-128, 1972.*

The absorption of hydrogen chloride, chlorine, and carbon dioxide from waste gases generated in magnesium production by chlorinated solutions of slaked lime and soda is described with respect to secondary reactions taking place in the scrubbing solution. The calcium hypochlorite and sodium hypochlorite formed in the absorbent solution react with carbon dioxide and hydrogen chloride present in the waste gases to release chlorine from the solution. Therefore, this one-stage method is unsuitable for the purification of these waste gases due to the desorption of chlorine. Selective absorption of hydrogen chloride with water or another absorbent, and absorption of chlorine with alkaline solutions is proposed.

52961 **APTIC NO. 77462**

Starenchenko, V. G., M. L. Varlamov, and A. P. Kalashnikov

RECOVERY OF SULFUR DIOXIDE FROM WASTE GASES IN THE PRODUCTION OF MANGANESE ZINC FERRITE POWDERS BY THERMAL DECOMPOSITIONS OF SULFATE SALTS. *(Ulavlivanie sernistogo angidrida iz otkhodyashchikh gazov proizvodstva marganets-tsinkovykh ferritovykh poroshkov metodom termicheskogo razlozheniya sernokislykh soley). Text in Russian. Tezisy Dokl. Mezhotrasl. Soveshch. Metod. Poluch. Anal. Ferritovykh, Segneto-, P ezoelektricheskikh Kondens. Mater. Syr ya Nikh, 4th 1971, p. 118-119, 1972.*

The catalytic oxidation of sulfur dioxide contained in waste gases generated during the production of manganese zinc ferrite powders by thermal decomposition was studied. A solution containing 10 g manganese sulfate and 20 g iron sulfate per liter as catalyst was most effective. For waste gases with less than 0.5% SO2, the best result was achieved with this catalytic solution at 20 C. The gas cleaning was done by means of a plate column. The highest efficiency in SO2 removal was 92%.

52962 **APTIC NO. 76852**

Stichting CONCAWE, The Hague (Netherlands)

A STUDY OF THE COSTS OF RESIDUE AND GAS OIL DESULPHURISATION FOR THE COMMISSION OF THE EUROPEAN COMMUNITIES. *Rept. 13/72, 24p., Dec. 1972.*

Cost estimates for the desulfurization of gas oils and residual fuel oils are presented for the Commission of the European Communities. The cost data represent the joint opinion of 20 major oil refining companies participating in the study. Direct hydrodesulfurization, which has a desulfurization efficiency of between 70 and 90%, is expected to require an annual capital investment of $15-$32/ton capacity and a total operating cost of $6.5-$11.8/ton feedstock. The cost of indirect desulfurization per ton of residue processed is lower than that of direct desulfurization, but the sulfur removal efficiency is lower (30-45%).

1971

52963 **APTIC NO. 77465**

Agaev, A. S., Y. B. Nadzhafov, A. G. Nagileva, S. O. Arzumanova, and Z. A. Khalilova

COLLECTION OF CATALYST DUST FROM WASTE GASES OF ROASTING OVENS OF CATALYST FACTORIES. *(Ulavlivanie katalizatornoy pyli iz dymovykh gazov prokalochnykh pechey katalizatornykh fabrik). Text in Russian. Tr. Vses. Neft. Nauch. Issled. Inst. Tekh. Bezop., no. 21:70-72, 1971.*

A high-efficiency wet scrubber for the separation of catalyst dust from flue gases in aluminosilicate roasting ovens in catalyst factories is described. The dust emitted by the aluminosilicate catalyst roasting ovens contained about 87% silica, which made dust separation necessary. The hot flue gases admitted into the scrubber are first deflected to precipitate coarse dust particles, after which finer fractions are separated by a water spray. The catalyst dust collected at the bottom of the scrubber in the form of sludge can be dewatered for recycling.

MEASUREMENT METHODS

1975

52964 **APTIC NO. 77365**

Becker, Karl Heinz, Andreas Heindrichs, and Ulrich Schurath

A PORTABLE UNIT FOR THE CALIBRATION OF OZONE ANALYZERS BY MEASUREMENT OF THE OPTICAL ABSORPTION. *(Ein transportables Geraet zur Kalibrierung von Ozonanalysatoren durch Messung der optischen Absorption). Text in German. Staub, Reinhaltung Luft, 35(9)326-329, Sept. 1975. 12 refs.*

An instrument for the rapid calibration of ozone analyzers over the concentration range of 10 ppb to several ppm is described. It includes a photochemiical ozone source. The ozone concentration is calculated from the optical absorption of monochromatic 253.7 nm radiation, as measured in a tubular absorption cell. Due to its short response time, the instrument is particularly well-suited for the calibration of chemiluminescent analyzers which exhibit comparable time constants.

52965 **APTIC NO. 77617**

Birkle, Michael

AUTOMATIC POLLUTANT MEASURING NETWORK. *Siemens Rev., 42(3):95- 101, March 1975. 25 refs.*

A continuous air pollution monitoring system is described which consists of several monitoring units automatically supplying data for computer processing. Each monitoring unit contains up to four sensors and equipment for checking the instruments. The transmission of data and means of checking the sensors are described. The comparison procedure is also described by which the computer distinguishes data resulting from unusual pollution conditions from data resulting from malfunction of a sensor.

52966 **APTIC NO. 77603**

Collet, P.

DETERMINATION OF TRACES OF HEAVY METALS IN FOOD BY MEANS OF INVERSE POLAROGRAPHY. I. DETERMINATION OF LEAD, CADMIUM AND COPPER. *(Die Bestimmung von Schwermetallspuren in Lebensmitteln mit Hilfe der Inverspolarographie.*

I. Die Bestimmung von Blei, Cadmium und Kupfer). Text in German. Deut. Lebensm. Rundsch., 71(7):249-253, 1975. 6 refs.

A technique that can be used for finding traces of lead, cadmium and copper (detection limits: Pb 2.6 ng/ml, Cd 0.25 ng/ml, Cu 6 ng/ml) in foodstuffs in a single operation through inverse polarography is described. Derangement of the lead peak through tin is prevented by evaporating the solulizable solution with NH4J. Reproducibility of peak levels was monitored over a fairly long period of time. Lead, cadmium and copper contents of 298 food samples analyzed in 1974 are presented.

52967 **APTIC NO. 77349**

Dalager, Soren

CORRELATIONS BETWEEN METHODS FOR MEASURING SUSPENDED PARTICULATES IN AMBIENT AIR. *Atmos. Environ., 9(6/7):687-691, June/July 1975. 11 refs.*

Four commonly used methods for measuring particulate matter in ambient air,, OECH (smokeshade), the AISI tape sampler, the beta-attenuation, and the LIB Hi-vol method are discussed. Parallel measurements are made in two Danish cities, Copenhagen and Aalborg. In Aalborg, three cement plants are in operation. Linear regression analyses of the results give a good correlation between the optical methods (OECD and AISI), a fair correlation between the gravimetric (Hi-vol and beta-attenuation), but only a poor correlation between the optical and gravimetric methods. None of the regression equations derived are of a universal nature, probably because the composition of the aerosol is of great importance. Only Hi-vol samplers can provide a reasonably correct measurement of suspenced particles in ambient air. An international standard method is necessary, but the OECD method due to its arbitrary nature is useful only for determining long term changes in dark smoke. (Author abstract modified)

52968 **APTIC NO. 77446**

Flashberg, Larry S., E. S. Johnson, and Robert J. Bambeck

AUTOMATICALLY CORRELATING FLUE GAS MEASUREMENTS USING CARBON DIOXIDE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 12p., 1975. 2 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-60.5.)*

The ratio of the carbon dioxide (CO2) concentration produced under theoretical burning conditions to the measured CO2 concentration is derived as the conversion factor relating measured concentrations of nitric oxide and sulfur dioxide to those which would be produced under theoretical conditions. Theoretical concentrations are often used to compare data on effluents from different facilities, since dilution of the effluents with air or water vapor usually occurs. An analyzing system based on absorption spectroscopy is described, which uses a light beam to determine effluent concentrations.

52969 **APTIC NO. 77427**

Hermann, Peter and Walter Rode

SEMI-AUTOMATIC DETERMINATION OF THE FLUORINE CONCENTRATION IN SAMPLES FROM GAS IMMISSION MEASUREMENTS AND FROM PYROHYDROLYSIS OF SOLID MATERIALS. *(Halbautomatische Bestimmung des Fluorgehaltes in Proben aus Gasemissionsmessungen und in Feststofaufschluessen). Text in German. Staub, Reinhaltung Luft, 35(8):298-302, Aug. 1975. 14 refs.*

The fluoride contents of solutions received from emission measurement and from pyrohydrolysis of solid materials were determined by semiautomated analysis using three ion-specific electrodes. The time required is 18 min for each sample. The standard deviation is s equals 0.04 mg/l at fluoride concentrations of 1 to 2 mg/l and s equals 0.02 mg for a sample containing 0.05 to 1 mg fluoride. Interferences by aluminum and magnesium ions were not found at concentrations up to 1 mol/l. The detectable limit of the method is 1.7 times 10 to the -6th power mol/l or 0.03 mg.

52970 **APTIC NO. 77426**

Juck, Alsfons and Jan Letz

A NEW METHOD OF THE PARTICLES SHAPE ANALYSIS BY THEIR APPROXIMATION AT THE ELLIPSOIDAL SHAPE. *Staub, Reinhaltung, Luft, 35(8):292-294, Aug. 1975. 3 refs.*

A new method for particle shape analysis is demonstrated on the polymer powders isotactic polypropylene and polyvinyl chloride. The particle shape is approximately a rotational ellipsoid in which the particle shape polydispersity is expressed as a first approximation to an elongated shape. The ellipsoid parameters, especially the coefficient of elongated shape, on which a sufficiently numerous set of the particles is approximated and averaged, are calculated from the coefficient of elliptical elongated shape obtained by the evaluation of microphotographs. The influence of elongated shape on increasing specific surface of powders is discussed.

52971 **APTIC NO. 76878**

Kanno, S., A. Takahashi, and A. Sato

RECENT ADVANCEMENT OF POLLUTION ANALYTICAL METHOD. *(Saikin no kogai bunseki hoho ni shinpo). Text in Japanese. Keiryo Kanri Keisoku Keiso (J. Instrum. Control Assoc. (Japan), 24(6):274-281, June 1975. 3 refs.*

Specific ion electrode and non-flame atomic absorption are described as air pollution analytical methods. Cyanide, cadmium, chloride, bromide, iodide, silver, sulfide, copper, ammonia and lead electrodes are capable of determining as low as 0.02 ppm, 0.005 ppm, 0.35 ppm, 0.08 ppm, 0.13 ppm, 0.01 ppm, 0.32 ppm, 0.03 ppm, 0.05 ppm and 0.02 ppm of the respective ions at below plus and minus 5% standard deviation. The ion electrode method is widely applied in air and water pollution analysis due to its simple operation and high accuracy. The non-flame atomic absorption method has not yet been applied to air pollution analysis but the application is very feasible. Analysis of Pb, zinc, iron, manganese, and Cd in air is possible by using low-volume samplers followed by dissolving with diluted nitric acid. An air microsampler capable of analyzing Pb in 2 min by sampling 200 ml of air is being developed by Nichiden-Varian Co.

52972 **APTIC NO. 76841**

Kobayashi, Toshiro and Katsumi Yasui

A CONSIDERATION OF ATMOSPHERIC PARTICULATE SUBSTANCE ANALYTICAL METHOD BY X-RAY MICRO-ANALYZER. *(X-sen maikuro-anaraiza ni yoru taiki-chu no ryujo bushitsu bunseki ho no ichi kosatsu). Text in Japanese. Kansai Denryoku Sogo Gijutsu Kenkyusho Hokoku (Kansai Elec. Gen. Tech. Res. Inst. Rep.), no. 15:124-128, March 1975.*

An analytical technique for airborne particulates by X-ray micro-analyzer is presented. The airborne particulates were trapped on a filter paper using a high volume air sampler for 24 hr sampling from an urban atmosphere and analyzed. Of the several different types of filter papers tested (Millipore, Fluorore, Micro, Humico (?), and Toyo filters) the Humico filter of 0.6 micron pore size was the most suitable filter paper for this technique. The particle distribution of elements was determined from the generated electron beam images. Thhe iron particles were present in amorphous lump-like particles, while silicon and aluminum were present together in amorphous cloud-like particles. Other elements such as copper, zinc, nickel, magnesium, sodium, chloride, and carbon were not found in particles larger than 5 micron, but they were found uniformly in the smaller particles.

52973 **APTIC NO. 76860**

Kunzmann, G., W. Meyer, and W. Schultheis

FIRST STEPS TOWARDS IMMISSIONS MONITORING. (Erste Schritte zur Immissionsueberwachung). Text in German. Technik, 30(6):396-397, 1975. 14 refs.

Industries in the German Democractic Republic are required by law to keep their emissions below the limit values. For the measurement of individual air pollutants, manual and automatic methods are permitted. The measurement methods for the most important pollutants have to be standardized according to law. A separation of sampling and measurement is recommended for two reasons: it reduces costs, and the frequently low concentrations which have to be measured can be determined more accurately in the laboratory. For carbon disulfide, the short-term maximum allowable immission concentration (which should not be exceeded for periods longer than 10 to 30 min) is 0.030 mg/cu m, and the long-term maximum allowable emission concentration is 0.003 mg/cu m. The diethyldithiocarbamate copper method for the measurement of immission concentrations of CS2 is not accurate enough but it is used for want of a better method.

52974 **APTIC NO. 77623**

Kuwana, Theodore and Jerzy Storjek

SPECTROPHOTOMETER UTILIZING SOLID STATE ARRAY DETECTOR FOR SULFUR DIOXIDE DETECTION AND MEASURING. *Roczniki Chem., 49(2):379-385, 1975. 12 refs.*

The use of a linear array diode as the detector in a spectrophotometer for the measuring of sulfur dioxide is described. The concentration of SO2 within the range 100-2000 ppm can be determined with a single pass of the beam through the cell of 50 cm length. Higher sensitivities are obtained by using a multiple pass sample. The limitations of the instrument are determined by the noise of the array detector, the non-linear wavelength distribution of the light intensity of the xenon lamp, the wavelength dependence of detector sensitivity, and the instability of the xenon light source.

52975 **APTIC NO. 77622**

Marshall, G. B.

THE DETERMINATION OF SULPHUR DIOXIDE IN THE AMBIENT ATMOSPHERE-- A SURVEY OF SOME INTERFERENCE EFFECTS. *Clean Air, 5(17):15-21, Spring 1975. 43 refs.*

The interference effects encountered in the determination of sulfur dioxide in the ambient atmosphere are discussed. The principles of operation are explained for both manual and automatic continuous analyzers. The methods include: titrimetric, colorimetric, electroanalytical, gas-chromatographic/ flame photometric detectors, correlation spectrophotometric detectors, and static sampling methods. Interference effects are prevalent in the determination of SO2, but the reliability of an analytical method is dependent upon many other factors. (Author abstract modified)

52976 **APTIC NO. 76858**

Matsumoto, Yutaka

STUDIES ON THE DETERMINATION OF HEAVY METALS IN AIRBORNE PARTICULATE MATTER BY LOW TEMPERATURE ASHING AND ATOMIC ABSORPTION SPECTROMETRY. *(Teion haika - genshi kyuho ho ni yoru taiki fuyu funjin chu no jukinzoku no teiryo). Text in Japanese. Hokkaido Kogai Boshi Kenkyusho Ho (Rep. Hokkaido Res. Inst. Environ. Pollut.), no. 1:69-73, March 1975. 4 refs.*

An atomic absorption spectrophotometric method for determining heavy metals in airborne particulate matter is described. Air is sampled with a high volume sampler fitted with a Gelman A fiber glass filter. The collected airborne particulates on the filter are placed in the ashing chamber of a low temperature ashing device, and ashing is carried out at 200 milliampere plate output and 2-3 mm mercury for 3 hr. Hydrochloric acid (20%, 30 ml) and aqueous hydrogen peroxide (30%, 5 ml) are added to the ash; and the mixture is heated for 30 min, during which 5 ml of 30% hydrogen peroxide solution is added. The solution is cooled and filtered, and the container is washed with hot water. The combined filtrates are evaporated to near dryness. The residue is dissolved in 3 ml nitric acid solution (1:2) by heating, and the solution is diluted with HNO3 solution (2:98) to 25 ml. The solution is then analyzed for heavy metals by atomic absorption. Recoveries of more than 96% are achieved for cadmium, lead, nickel, manganese, and iron.

52977 **APTIC NO. 77366**

Meier, Hans and Ernst Unger

ON THE PROBLEM OF DETERMINING METALLIC POLLUTANTS AT THE WORKING PLACE BY MEANS OF ISOTOPE-EXCITED X-RAY FLUORESCENCE. *(Zur Frage der Bestimmung metallischer Schadstoffe am Arbeitsplatz mit Hilfe der Radionuklid-Roentgenfluoreszenzanalyse). Text in German. Staub, Reinhaltung Luft, 35(9):321-326, Sept. 1975. 117 refs.*

The possibility of application, especially for cadmium, of istope-excited energy dispersive X-ray fluorescence analysis for the determination of metallic noxious substances from dust samples was examined. Measurements showed that this analytical method, because of its multi-elementary character, short measurement time, simple preparation of samples, and good detection limits (down to 1 microgram/cm sq), could be the basis for a monitoring system for the determination of metallic noxious substances.

52978 **APTIC NO. 77599**

Nakahara, Shojiro, Katsuyoshi Ito, and Toshikazu Saeki

DETECTING DEVICE FOR AIR POLLUTION GASES. *(Taiki osen gasu kenshutsu sochi). Text in Japanese. (Mitsubishi Electric Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-17275. 2p., June 19, 1975. 2 refs. (Appl. Sept. 8, 1970, 1 claim).*

An analytical instrument for gaseous air pollutants in which the absorption of a monochromatic light beam by pollutants at their characteristic absorption line could be measured is described. From the measured absorption, the average concentration of pollutant within the light beam could be determined. The light source to be used was a monochromatic laser beam tuned to the desired wavelength, and its second harmonic oscillation could be used as the reference beam if the wavelength was not absorbed by other coexisting pollutants.

52979 **APTIC NO. 76771**

Prietsch,, W.

DETERMINATION OF NITRIC OXIDES NEAR INTERNAL COMBUSTION ENGINES ACCORDING TO THE MODIFIED SALTZMAN METHOD. *(Bestimmung von Stickoxiden im Emissions-bereich von Verbrennungsmotoren nach dem modifizierten Saltzman-Verfahren). Text in German. Z. ges. Hyg. Ihre Grenzgebiete (Berlin), 21(4):298-302, 1975. 23 refs.*

A comparison of measurements using infrared spectroscopy, chemiluminescence, phenoldisulfonic acid, and the Saltzman method revealed that the modified Saltzman method gave reliable values in the concentration range of 300 to 4100 ppm, if a Saltzman factor of 0.72 was used. The Saltzman method has the added advantage of saving considerable time. It is based on the reaction of nitrogen dioxide in a solution containing acetic acid, sulfanilic acid and N- (1-naphthyl-)ethylene diaminedihydrochloride producing a red azo dye with an extinction maximum at 550 nm.

52980 **APTIC NO. 76835**

Rameux, R. and C. Jolliot

CONTRIBUTION OF THE ELECTRICITE DE FRANCE TO AIR POLLUTION CONTROL IN THE PARIS REGION. *(La participation d Electricite de France dans la lutte contre la pollution atmospherique dans la region parisienne). Text in French. Rev. Gen. Thermique (Paris), 14(157):27-41, Jan. 1975.*

An acid pollution monitoring system installed in Paris and its suburbs around power plants is described. The network is composed of 20 Seres and five Biolafitte model AFG analyzers for continuous pH measurement. The sampling stations are connected to a central computer for data processing and alarm release. The alarm threshold is set at a sulfur dioxide concentration of 600 micrograms/cu m as an hourly mean. At wind speeds below 2 m/sec, the alarm is activated whenever three sampling stations in or around Paris measure concentrations over 600 mg/kg for more than 1 hr. At wind speeds over 2 m/sec, the alarm is released whenever sampling stations in the plume direction have recorded values over 600 micrograms/cu m for more than 1 hr. The alarm notifies the power plants that they are required to reduced their load or to switch over to low-sulfur fuel oil.

52981 **APTIC NO. 76747**

Reist, Parker C.

COUNTING ASBESTOS FIBERS BY THE MOST PROBABLE NUMBER METHOD. *Am. Ind. Hyg. Assoc. J., 36(5):379-384, May 1975. 6 refs.*

A procedure for counting asbestos fibers by the most probable number method of bacteria counting is described. The method eliminates the need to resolve individual fibers; and, with low densities normally found, it gives the same counting accuracy as conventional counting in a much shorter time period and with much less eyestrain. The method suffers from a lack of rigor, however, and requires the observer to estimate fiber concentrations to within an order of magnitude before counting. A number of fields are scanned to determine only whether fibers are or are not present in any given field. Then by taking the natural log of the ratio of the number of fields scanned divided by the number of fields containing no fibers, the most probable number of fibers per field can be estimated. As the number of fields scanned is increased, the accuracy of the estimate increases.

52982 **APTIC NO. 76761**

Schinkmann, Manfred

ASPECTS OF GAS ANALYSIS BY ABSORPTION SPECTROSCOPY. *(Aspekte der absorptionsspektroskopischen Gasanalyse). Text in German. Draeger Heft., 300:28-36, 1975. 10 refs.*

Following a review of the fundamentals of absorption spectroscopic gas analysis, the three main spectroscopic methods, dispersive, non-dispersive, and laser spectroscopy are discussed. Analyzers operating according to the dispersive method require a dispersion medium (prism, diffraction screen, inteference filter). Non- dispersive spectroscopy compares the spectrum of the gas to be examined with that of a reference gas of pre-determined concentration. Laser operation spectroscopy is characterized by high selectivity. Carbon dioxide (CO2), water (H2O), nitric oxide (NO) nitrogen dioxide (NO2), formaldehyde (H2CO) acetone (CH3)2CO, and acetaldehyde (CH3)HCO can be determined with the CO laser, benzene (C6H6), ethylene (C2H4), hydrogen fluoride (H2S) and ozone (O3) with the CO2 laser. Ammonia can be determined with either the CO, the CO2, or N2O laser, or by sulfur dioxide with the CO2 or xenon laser.

52983 **APTIC NO. 77428**

Schliephake, Rolf-Werner

X-RAY DIFFRACTION OF MINE DUSTS OF GERMAN HARD COAL MINES. REPRODUCIBILITY OF THE QUARTZ DETERMINATION AND INDIRECT DETERMINATION OF THE ASH CONTENT. *(Roentgenographische Untersuchungen an Grubenstaeuben des deutschen Steinkohlenbergbaus. Reproduzierbarkeit der Quarzbestimmung und indirekte Ermittlung des Aschegehaltes). Text in German. Staub, Reinhaltung Luft, 35(8):295-297, Aug. 1975. 15 refs.*

Information is given about the reproducibility and the limit of identification in the routine determination by X-ray diffraction of the quartz contents of German coal mine dusts. The ash content of the dust samples can be determined indirectly from the mass absorption coefficient, thus reducing the time and labor for routine investigations.

52984 **APTIC NO. 77429**

Schuch, Gunter and Friedrich Loeffler

MODEL CALCULATIONS CONCERNING DISTRIBUTION PROBABILITY OF AEROSOL PARTICLES IN CASCADE IMPACTORS. *(Modellrechnungen zur Verteilungswahrscheinlichkeit von Aerosolteilchen in Kaskadenimpaktoren). Text in German. Staub, Reinhaltung Luft, 35(8):289-292, Aug. 1975. 3 refs.*

To determine a particle size distribution by means of a cascade impactor, certain data of the apparatus must be known. The median diameters of the stage efficiency curves are best suited for characterizing the respective stages. The corrections necessary in the case of narrow distributions can be made when the stage efficiency curves are given.

52985 **APTIC NO. 77517**

Schurath, Ulrich and Werner Wendler

THE SUITABILITY OF OZONE CONTAINING OXYGEN FOR THE CALIBRATION OF OZONE ANALYZERS. *(Ueber die Verwendbarkeit von ozonhaltigem Sauerstoff zur Kalibrierung von Ozonanalysatoren). Text in German. Staub, Reinhaltung Luft, 35(9):329-330, Sept. 1975. 4 refs.*

The response of a chemiluminescent ozone analyzer was shown to depend on the concentration ratio of oxygen to nitrogen in the test gas. Therefore, pure synthetic air is preferable for calibration purposes. If pure oxygen is used the sensitivity loss in the chemiluminescent analyzer is about 47%. The relative change of sensitivity must be individually measured for each type of chemiluminescent analyzer.

52986 **APTIC NO. 77588**

Suzuki, T., K. Shimizu, Y. Ikebe, and M. Shimo

PARTICLE SIZE DISTRIBUTION DETERMINATION OF SUBMICRON PARTICLES BY THE STATIC METHOD. *(Static hoshiki ni yoru sabumikuron ryushi no ryukei bunpu sokutei). III. Text in Japanese. Taiki Denki Kenkyu (Proc. Soc. Atmos. Electr. Jap.), no. 13:117-122, 1975. 5 refs.*

Four groups of diffusion tubes (4 tubes in each group) 0.8 cm in diameter and 125 cm in length were filled with a sample gas containing a given concentration of aerosols (Zo). The aerosol concentration decreased to (Z) at time (t) due to diffusion. The Pollack counter was vacuumed and filled with filtered air to 0.2 atm. Sample gas was introduced into the Pollack counter from one of the diffusion tubes at time (t) and filtered air was added to make a total pressure of 1.2 atm. Adiabatic expansion was carried out on the compressed air and the decline of light intensity due to the fog formation was measured by the output change of the photo cell. The aerosol concentration (Z) at time (t) was obtained from the output change by using a calibration curve. Automatic measurement was performed by using a C.N.C. controller. Analysis of the particle distribution at the Nagoya University campus showed a distribution peak at 0.01 micron.

52987 **APTIC NO. 76907**

Takahashi, Seiji, Takeshi Murata, Tsunezo Takeda, and Masaya Iwanaga

THE APPLICATION OF GCMS (GAS CHROMATOGRAPHY MASS SPECTROGRAPHY) TO THE MEASUREMENTS IN ENVIRONMENTAL POLLUTIONS. *(GCMS(Gasukuromatogurafu shitsuryo bunsekikei) no kogai keisoku eno oyou). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo (Japan), p. 170-171, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

Gas-chromatography, which is suited for the separation and quantitative analysis of various pollution components, is not suited for identification of the compounds. This weakness was eliminated by the combination of GC and a mass spectrograph. A GCMS-7000 or -9000 was connected with a high speed multi-ion detector-peak matcher, MID-PM. The data were treated with the GCMSPAC-300 D system. The compounds eluted from the column were scanned at a high speed at a definite time interval of 3-6 sec. The application of this system was made on flue gas which contained naphthalene, acenaphthene, pyrene, and benzopyrene. The identification was successful. Benzofuran was eluted more easily than Naphthalene. A compound, which gave a mass of 208 between pyrene and fluoranthene was identified by flame photometric determination as 4,5 phenanthrene sulfide. A mass fragment graph was designed. The main magnet of the mass spectrograph was fixed at a definite mass number. The switching of the accelerating voltage to different voltages gave the mass numbers for plural species simultaneously. With this modification, the detection of chemical species became possible to as small an amount as nanogram and picogram orders.

52988 **APTIC NO. 76886**

Tanaka, T. and M. Matsumoto

AIR-SAMPLING FILTER PAPER AND MASS DETERMINATION. *(Ea-sanpuringu yo roshi to shitsuryo sokutei). Text in Japanese. Keiryo Kanri Keisoku Keiso (J. Instrum. Control Assoc. Japan), 24(6): 287-294, June 1975. 15 refs.*

Three major factors for filter materials are collecting efficiency, pressure loss, and load. For air sampling filters, the important characteristics are light weight, no weight variation due to separation of a part of the filter material, low hygroscopicity and adsorbability, low impurity content which might interfere with measurement, easy separation of collected substances on filter, sufficient tenacity, and thermal stability and sufficient collecting efficiency. Measurement methods for particulate matters collected on filters are reviewed with reference to general charactericties of cellulose fiber filters, glass fiber filters, and membrane filters. The composition, physical properties, and characteristics of filters used for sampling in flue stacks or ducts such as dust tubes filled with glass fiber, cellulose, glass, or silica glass fiber board or cylinder are evaluated. The characteristics and physical properties of cellulose, glass, and membrane filters used commonly for high volume and low volume air samplers, filters for radioactive particulates and filters designed for measuring particulates of cadmium, chromium, arsenic trioxide, beryllium, manganese, and coal tar are evaluated.

52989 **APTIC NO. 76827**

Taniguchi, Naozoh

APPLICATION TECHNIQUES FOR PROCESS GAS CHROMATOGRAPH. *(Purocesu gasu kuromatogurafu no tekisetsu na riyoho). Text in Japanese. Yokokawa Giho (Yokokawa Tech. Rept.), 19(1):11-14, 1975. 4 refs.*

Approximately 1200 process gas chromatographs are being used in Japan for industrial pollution control monitoring and other applications. Chromatography for monitoring is most often applied to the control of sulfur recovery equipment. It is also used for monitoring desulfurization devices. Process gas chromatography is especially useful for measuring hydrocarbons and such odorous compounds as hydrogen sulfide and mercaptans. Since gas chromatographs can be made of anticorrosive materials, they can be used for measuring hydrogen chloride from gas generated by incinerators.

52990 **APTIC NO. 76834**

Thoenes, Hans Willi

ANALYSIS AND RESULTS OF IMMISSION MEASUREMENTS. *(Analytik und Immissions-Messergebnisse). Text in German. Staub, Reinhaltung Luft, 35(4):142, 1975.*

Studies designed to standardize the analysis of oxides of nitrogen on a national and international level are reviewed. Research activities include: nitrogen dioxide determination by the Griess-Saltzman method; automatic recording methods for nitric oxide, NO2, and total NOx, particularly the chemiluminescence method for air quality monitoring; sampling with the aid of alkaline media and analysis of NO2; examination of thee oxidation and reduction methods for sampling and analysis of NO, NO2, and total NOx, sampling and analysis of total NOx levels in the emission range; and automatic recording methods for NO, NO2 and total NOx for emission monitoring.

52991 **APTIC NO. 77537**

Yoshizawa, S.

CARBON DIOXIDE AND CARBON MONOXIDE. *(Tansan gasu issanka tanso). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air-Conditioning, Sanitary Eng.), 49(3):66, March 1975.*

Relatively simple and rapid measurement methods for indoor carbon dioxide and carbon monoxide are reviewed. The CO2 measurement is relatively easy since CO2 is found in high concentration; 300 to 3000 ppm. The methods for CO2 are a detection tube method, barium hydroxide method, interferometry, and non-dispersive infrared absorption. The detection tube method uses a small tube packed with absorbent with alkaline solution, in which CO2 reacts with water forming carbonic acid that is neutralized by the alkaline on the absorbent and changes the color of the absorbent. The barium hydroxide method utilizes the neutralization of produced carbonic acid; however, the CO2 is determined from the amount of unreacted barium hydroxide by titration. The non-dispersive IR method is suitable for a continuous CO2 analysis and it does not suffer from interference by other compounds except water. The indoor CO levels is much lower than the CO2 level. The available methods are colorimetry with a packed tube, non-dispersive IR absorption, and electrochemical techniques. The tube, packed with palladium sulfate and ammonium molybdate on a silica gel, gives the color change depending on the amount of CO passed through the tube. The non-dispersive IR method for CO determination is not as good as for the CO2 analysis; it requires a longer absorption tube to determine the smaller amount of CO and the interferences by water and CO2 are large. The electrochemical method utilizes the electrochemical reaction of CO to CO2 in an electrolytic solution, which accompanies the voltage change in the solution. There is no interference by water and CO2 in this method, however a small interference by nitric oxide, nitrogen dioxide, and ethylene are involved.

52992 **APTIC NO. 76773**

TECHNICAL DATA ON X-RAY FLUORESCENCE ANALYSIS: MEASUREMENT METHODS FOR POLLUTANTS IN AIRBORNE ATMOSPHERIC DUSTS (2). *(Keiko X-sen bunseki tekunikaru deta: Taiki fuyu funjin chu no kogai busshitsu sokuteiho (2)). Text in Japanese. Toshiba Rebyu (Toshiba Rev.), 30(5):445-446, May 1975.*

By using X-ray fluorescence analysis, with suitable standards for comparison, heavy metals (manganese, iron, copper, and nickel) in airborne particulates were detected in amounts of 0.004-7.4 micrograms/cu m of air. Limits of detectability per test sample, in micrograms, were: Mn, 0.03; Fe, 0.05; Cu, 0.03; and Ni, 0.02. Standards can be made up by several means, taking a part of the dust sample collected by high-volume sampler and analyzing amounts by atomic absorption methods; making up samples of known amounts of metals by precipitation from aqueous solutions with organic precipitants such as DDTC (diethyl dithiocarbamic acid) and PAN (pyridyl azonaphthol); and making up samples of known amounts of metals adsorbed on ion-exchange resins added to aqueous solutions of the metals. Analysis of atmospheric sulfur and chlorine is feasible by X-ray fluorescence analysis.

1974

52993 **APTIC NO. 77400**

Eba, H., T. Ogawa, and Y. Takai

FACTORS OF FUNDAMENTAL ERRORS FOR EMISSION SPECTROGRAPHIC DETERMINATION OF THE TRACE METAL ELEMENTS IN AIRBORNE PARTICULATES. *(Fuyu funjin chu biryo genso no hakko bunko bunseki ni okeru gosa yoin). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Rept. Environ. Pollut. Res. Cent. Aichi Pref.), no. 2:131-136, 1974. 8 refs.*

The error factors involved in the spectrographic determination of micro-amounts of element in airborne particulates were experimentally evaluated. Errors due to emission conditions such as analytical gap, slit width, and excitation source were investigated by preparing a pre-calibration curve, which indicated that the emission characteristics of dry-plate were independent of emission conditions. The variation in spectrum intensity with exposure time at 30 sec and 100 sec showed no ill effect on reproducibility. Errors due to the spectroscopic system such as displacement of the light axis, mirror mask, and displacement of the projected image were checked, and no problems were found. Errors due to dry-plate and its development were checked, and were found negligible if the exposed dry-plate was developed on the same day. Errors in the measurement of transmittance ranged from 1-1.5%, and the use of a calibration curve was required. In the preparation of calibration curves, only the error in reading spectrum intensity was involved. The identical treatment of sample and standard reduced errors and improved accuracy. The accuracy of analysis in terms of standard deviation was 1.92-14.3%.

52994 **APTIC NO. 76883**

Ishida, K. and S. Takanashi

INFLUENCE OF TIME ELAPSED AFTER PREPARATION OF LEAD CYLINDER ON THE MEASURED VALUE. *(Nisankaen ento choseigo no jikankeika ga sokutei-chi ni oyobosu eikyo). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Rept. Environ. Pollut. Res. Cent. Aichi Pref.), no. 2:25, 1974.*

The effect of time elapsed after the lead dioxide cylinder preparation on the analytical values is studied. Thirty lead dioxide cylinders were prepared at the same time, and kept in a polyethylene bag until they were exposed. The cylinders were exposed at different periods after the preparation. After the exposure of the cylinder, the amount of barium sulfate on the cylinder was determined, and its analytical value was compared with that obtained by the reference lead dioxide cylinder which was prepared 2 days before the exposure. The analytical results obtained by the tested cylinder and the reference cylinder did not differ significantly. The analytical value obtained by the cylinder stored for 10 months was 50.2 mg barium sulfate, while that by the reference cylinder was 50.6 mg BaSO4 under the same exposing conditions.

52995 **APTIC NO. 77490**

Itaya, M.

SHIMAZU HYDROCARBON METER FOR AIR POLLUTION MEASUREMENT. *(Taiki osen sokutei ni katsuyaku suru Shimazu tankasuisokei). Text in Japanese. Shimazu Kagaku Kiki News (Sci. Instrum. News), 15(6):5-11, Dec. 1974. 2 refs.*

The model HCM-1A for total hydrocarbon measurement and HCM-3A for non-methane hydrocarbon measurement manufactured by Shimazu Instrument are described. The HCM-1A model has the following characteristics: 8 variable detection ranges for 1 ppm, 5 ppm, 10 ppm, 100 ppm, 500 ppm, 1000 ppm, 5000 ppm and 10,000 ppm; + and - 1% accuracy at full span; + and - 1% zero drift and span drift; response in 2 sec; and self-supply combustion hydrogen and zero gas. The instrument is suitable for the measurement of HC in air, automotive exhaust gas, diesel engine gas and flue gas, and for checking air conditioner efficiency and drying conditions at coating plants. The HCM-3A model has the following characteristics: it is usable for total HC or methane measurement; 3 variable detection ranges for 10 ppm, 25 ppm, and 50 ppm; automatic adjustment after analysis; and automatic introduction of standard gas at desirable intervals. The HCM-3A model is restricted to environmental application. Test results showed that the HCM-1A model and HCM-3A model gave consistent total HC concentrations at the same plant.

52996 **APTIC NO. 77336**

Jinbo, Yasuo, Shigenori Mihara, Teruo Sakakibara, and Masayuki Mori

AIR POLLUTION MONITORING SYSTEM. *(Taiki osen kanshi system). Text in Japanese. Sharp Giho (Sharp Tech. J.), 12(2):45-53, March 1974.*

A network of monitoring stations in prefectures and cities was created, using a telemetry system and minicomputers. The monitoring system, and software, and hardware to be used in the computer are described. In Ichihara City, Chiba Prefecture, measurements are taken at 19 positions for sulfur dioxide, nitric oxide, nitrogen dioxide, oxidant, wind direction, wind velocity, temperature gradient, and the temperature on the surface of the earth. Data are then sent to the air pollution monitoring center. The software of the monitoring system consists of a real time operating system, an on-line program, and off-line program. The hardware consists of a minicomputer, an input and output typewriter, a tabulating typewriter, a high-speed tape reader, a digital timer, a watching and control table, a multiplexer, an A-D converter, an input and output control apparatus, a reversed layer indicator, an analogue-type telemeter, a reversed layer-watching telemeter, and recorders. The specifications of the minicomputer are: cycle time, 1.2% microsecond; memory word length, 16 bit; memory capacity, 8 k words; memory element, magnetic core; operating system, 16 bit plus carry 1 bit; operation register, 4; page 0 address specification.

52997 **APTIC NO. 76866**

Jost, D.

ENVIRONMENT AND THE QUALITY OF LIFE. EQUIPMENT AND MEASUREMENT TECHNOLOGIES FOR DETERMINATION OF AIR POLLUTION. *(Umwelt und Qualitaet des Lebens. Geraete und Messtechniken fuer die Feststellung der Luftverschmutzung). Text in German. Pilotstation fuer Luftreinhaltung, Frankfurt/Main (Federal Republic of Germany), Commission of the European Communities, Rept. EUR 5135 d, 104p., Sept. 1974. 172 refs.*

A summary of the air pollution measuring methods used in industrialized countries is given. Methods which are used in European countries are emphasized. Measuring methods are grouped according to the gaseous and particulate air pollutants. Within each group, the discontinuous methods are handled first. For each continuous method the prices of the most important instruments are indicated. Carbon monoxide and carbon dioxide are measured by the non-dispersive infrared spectroscopy; sulfur dioxide discontinuously by tetrochloromercurate and continuously by colorimetry, coulometry, conductometry or flame photometry; nitrogen oxides discontinuously by the Saltzman method and continuously by coulometry or chemiluminescence; ozone by the potassium iodide method or by chemiluminescence. The indophenolblue method is used for ammonium; X-ray fluorescence or atomic absorption spectrometry for the lead content of aerosols. Dust fall is sampled in special receptors which are standardized in each country. Trisodium, phosphate is measured by light reflectance, light absorption, or beta absorption.

52998 **APTIC NO. 77535**

Katou, Tatsuo, Tomohiko Ishiguro, and Takashi Hasegawa

STUDY OF THE MEASUREMENT OF ILL-SMELLING SULFUR COMPOUNDS IN THE AIR. *(Taikichu akushu ioukagobutsu sokutei hoho no settei). Text in Japanese. Yokohama Kokuritsu Daigaku Kankyo Kagaku Kenkyu Senta Kiyo (Bull Inst. Environ Sci. Technol. Yokohama Natl. Univ.), 1(1):5-11, 1974. 4 refs.*

The analysis of carbonyl sulfide, hydrogen sulfide, methyl mercaptan, ethyl mercaptan, sulfur dioxide, dimethyl, sulfide, diethyl sulfide, and dimethyl disulfide by gas chromatography equipped with a flame photometric detector is described. The analyses were performed to establish a standard technique for measuring odorous compounds. A vacuum pyrex glass bottle of 1 l or 200 ml which is used for sample collection is bled into a 1,2,3, tris 2-cyanoethoxy propane 25% Shimalite AW tube cooled by liquid oxygen. The sample tube is then loaded on the chromatograph and the sulfur compounds are separated with six different columns, including the 1,2,3, tris 2-cyanoethoxy propane 25% Shimalate AW tube at temperatures between 60 to 70 C and at a helium gas flow rate of 40 to 50 ml/min. Calibration curves prepared for the above compounds range between 1 ng to 10 ng, and the detection error at the ppb level is within 10%. More than 90% of the sample compounds is retained in the collector bottle after 20 hr sampling. The stability decreases in the order of dimethyl sulfide, diethyl sulfide, dimethyl disulfide, dimethyl mercaptan, ethyl mercaptan, and hydrogen sulfide.

52999 **APTIC NO. 76875**

Kawato, Kenichi

ANALYZERS TO BE USED FOR ASSESSING ENVIRONMENTAL AIR POLLUTION. *(Kankyo keisoku no tameno bunseki-kei (jo)-Taiki osen-yo ni tsuite). Text in Japanese. Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.), 18(3):66-69, March 1974. 3 refs.*

Some typical air pollutant analyzers currently in use are described. The solution conductivity method was designed to analyze sulfur dioxide or sulfur trioxide. Hydrogen peroxide is used with sulfuric acid present as an absorbing solution for SO2 in the air. The electrochemical equivalent method, which measures the SO2 concentration is used to analyze SO2 or hydrogen sulfide. Although it is less precise than the solution conductivity method, the need to replace the solution is less frequent. The flame photometry method detects light adjacent to the ultraviolet region which is produced when sulfur compounds undergo thermal decomposition in a hydrogen flame. Digital dust-measuring equipment is used to measure suspended particles continuously. This device operates on the principles of Mie's scattering theory. This method permits the determination of the size and number of suspended particles.

53000 **APTIC NO. 76868**

Kihata, Masatoshi and Takakazu Shoji

DETERMINATION OF AIRBORNE PARTICLES BY LASER. *(Rezako riyo ni yoru fuyu ryushi tono sokutei). Text in Japanese. Preprint, Japan Society of Automatic Control, Kyoto, p. 519-520, 1974. 1 ref. (Presented at the Japan Society of Automatic Control Lecture Meeting, 17th, Kyoto, Japan, 1974.)*

Using a relatively weak neon gas laser (output 15 mW), the measurement of airborne particles by comparative measurement of laser decrement and laser interference was attempted. The experimental option system consisted of a laser oscillator, a slit for regulating beam quantity, a lens system for amplification, a sample cell, a photoelectric tube, D. C. voltmeter, an analog computer, and a pen recorder. The problems concerning the output stability of the laser oscillator, the dark current of photoelectric cell, the integrator, the retention of the sample, and noise due to halation are discussed, as well as their solutions. Using an optical system consisting of a light source, a sample cell, a mirror, a projection lens, and a screen, the airborne particles were photographed. The theory of imaging is described. The measurement results of cigarette smoke are given, which indicate the effectiveness of these methods.

53001 **APTIC NO. 76872**

Ookita, Toshiichi

PROBLEMS INVOLVED IN MEASUREMENT OF SUBSTANCES TO BE PRODUCED IN PHOTOCHEMICAL REACTIONS. *(Kokagaku hanno seiseibutsu no sokuteihojo no mondaiten). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 3(7):500-506, July 1974. 32 refs.*

Absorption photometry, in which neutral potassium iodide solution is used, was adopted to measure oxidants. A society for the study of measuring photochemical oxidants investigated the following factors relating to the standard measuring method: stability of the absorption solution; stability of the standard solution; the effect of nitrogen dioxide on equipment available for measuring oxidants; the rate of movement of NO2 in the scrubber of sulfur dioxide; the oxidation rate of nitric oxide in SO2. The extent of the interference of nitrogen oxides with ozone measurement varies with humidity and the type of instruments. An ultraviolet ray lamp may be used to measure ozone quantity. The following factors must be considered when using it: the voltage of the ozonizer affects the concentration of ozone produced and the concentration of ozone produced decreases with time when used in succession. Peroxyacyl nitrate is one of the substances produced in photochemical reactions. It is analyzed by gas chromatography with electron capture detection, which is very highly sensitive.

53002 **APTIC NO. 77463**

Prikhod ko, L. S., R. A. Pashneva, and L. V. Fedorina

DETERMINATION OF METHYLENE CHLORIDE IN INDUSTRIAL DISCHARGES INTO THE ATMOSPHERE. *(Opredelenie khloristogo metilena v promyshlennykh vybrosakh v atmosferu). Text in Russian. Khim.-Farm. Zh.), 8(6):56-58, 1974. 8 refs.*

A simple photometric method for the determination of methylene chloride in the atmosphere is described. Following absorption in glacial acetic acid, the sample is combined with pyridine and sodium hydroxide solution to obtain a color reaction. The color density is measured in a photocolorimeter with a 1-cm cuvette and a green filter. The quantity of methylene chloride is determined by a calibration curve.

53003 **APTIC NO. 76879**

Saito, Y., M. Uchiyama, I. Takahashi, Y. Shimada, and F. Hayashi

OFFENSIVE ODOR INVESTIGATION BY RESPONSE TEST. *(Kanno shiken ni yoru akushu chosa). Text in Japanese. Gunma-ken Kogai Kenkyu Senta Nenpo (Annu. Rep. Gunma Prefect. Res. Center Environ. Sci.), no. 6:140, Nov. 1974.*

The correlation between six grades of odor intensity and the sensing pleasantness index is examined by a selected panel of four people. The sensing pleasantness was divided into seven categories from the most pleasant to least pleasant. The most unpleasantness was given the index value of -3 and the most pleasantness was given the value + 3, while the value 0 was designated as no sensation. The panel members were asked to express the pleasantness index around pig sties. Although the five odorous substances defined by the odor control law (ammonia, methyl mercaptan, methyl sulfide, hydrogen sulfide, and trimethylamine) were initially sensed by the panel using the standard substances, no panel could distinguish any of these substances around the pig sties; therefore, the panel members reported the pleasantness by the compounded odor. A linear correlation between the six grades of odor intensity and the sensing pleasantness index was observed. The pleasantness in category 0 was equivalent to an odor intensity of 0.8 and the pleasantness in the category -2.0 corresponded to an odor intensity of 4. When the test was repeated, the panel members tended to report a lesser degree of pleasantness for the same odor intensity. According to the odor control law, the odor intensity standards in residential and industrial areas are 2.4 to 3.0 and 3.0 to 3.5 respectively, and these intensities correspond to - 1.1 to - 1.4 and - 1.4 to - 1.7 as sensing pleasantness index for the corresponding areas.

53004 **APTIC NO. 76892**

Saito, Yuzuru, Isao Takahashi, Yukiko Sakai, and Tsuneo Takishima

STUDY ON THE GAS DETECTOR. *(Gasu kenchiki no kento). Text in Japanese. Gunma-ken Kogai Kenkyu Senta Nenpo (Annu. Rep. Gunma Prefect. Res. Center Environ. Sci.), no. 6:138, Nov. 1974.*

The accidental death of 6 skiers in Gunma Prefecture occurred in 1971 and the cause of their death was hydrogen sulfide gas leaking out of a nearby hot spring bath. Although the H2S concentration was monitored at that time using an H2S detection tube whose measurable concentration range was up to 160 ppm, the complete color change of the detection tube within 10 sec was recorded. The calibration of this detection tube and the estimation of the H2S concentration at the accident scene were made using a calibrated detection tube. Standard H2S gas was prepared and the calibrated H2S detection tubes for both high and low H2S levels were used in the study. When two H2S detection tubes of the same type, the calibrated normal tube and the one used in 1971, were compared, 200 ppm H2S was required to change the color of the normal tube completely, however this H2S level did not change completely for the other tube and it required 10,000 ppm H2S to change the tube color completely. If the low H2S detection tube was used to determine the high H2S level, the estimation of H2S level could be made by the time required for the complete color change in the detection tube. With this fact, the H2S concentration at the accidental spot was estimated at least 10,000 ppm.

53005 **APTIC NO. 76828**

Sugimae, Akiyoshi

EMISSION SPECTROGRAPHY. B. DUST. *(Hakko bunko bunseki b, funjin). Text in Japanese. Preprint, Japan Spectroscopical Society, p. 31-37, 1974. 28 refs. (Presented at the Japan Spectroscopical Society Summer Seminar, 10th, Nagano, Japan, Aug. 6-9, 1974.)*

The emission spectrographic analysis via the solution method, powder method, and direct excitation of gases is reviewed. As a solution method, the National Air Sampling Network method (United States) is described. The problem of scattering volatile metallic elements during the muffle ashing and the effects of low temperature ashing, muffle ashing, and wet ashing on the percentage recovery of metallic elements are discussed, with measurement data being given. The powder method can be classified according to the type of filter material used for dust collecting. The analytical procedures, excitation conditions, and detectable elements when using asbestos-glass filters, filter paper, fiber glass filters, membrane filters, and activated charcoal filters are described. The direct excitation method can be used for monitoring. A beryllium monitoring method and a spectrothermal emission aerosol particle analysis are described.

53006 **APTIC NO. 77492**

Tsukamoto, H., M. Ohashi, and T. Sakai

SIMPLIFIED COLORIMETRIC DETERMINATION OF FLUORINE IN URINE AND PARTICULATE FLUORIDES IN ATMOSPHERE BY MEANS OF DIRECT DIFFUSION. *(Chokusetsu kakusan ni yoru kichi ryushi jo fukka- butsu narabini nyo-chu fusso no kanben hishoku sokutei ho). Text in Japanese. Tetsudo Rodo Kagaku (Science of Railroad Labor), no. 28:65-71, 1974. 11 refs.*

A simplified colorimetric method for the determination of fluorine in urine is described. The mean recovery of fluoride by the proposed method is 99.1% when fluorine is added to the urine. The standard value of fluorine content in urine by this method is 0.83 mg/l and 57.2 micrograms/hr. The upper limit of the 95% region is 3.51 mg/l and 299.5 micrograms/hr. This method is also successfully applied to the determination of fluorides in the atmosphere after the collection of particulates on a filter made of paper or glass fiber. In this case, the use of a glass fiber hinders the diffusion of fluorine. However, the accuracy of determination is not lost if a correction is made by preparing a calibration curve. Examinations of urine from workers at a factory where welding is done indicate safe concentrations of fluorine in the welding area.

1973

53007 **APTIC NO. 77565**

Carboni, C. and L. De Lindmann

EVALUATION OF ORGANIC LEAD IN THE AIR. *(Determinazione del piombo organico nell aria). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):534-539, 1973.*

A method for determining airborne organic lead is described. The procedure consists of adsorption of the lead on carbon pads, preferably impregnated with iodine, and the direct determination of the metal with X-ray fluorescence. The estimated precision of the method is about + or - 10%, and lead determinations of from 10-80 micrograms Pb can be made. The sampling period for 50 micrograms/cu m Pb in air varies from 2-8 hr at a sampling rate of 2 l/min. Operating conditions and calibration curves are presented along with schematic diagrams of the adsorbing package.

53008 **APTIC NO. 76856**

Stichting CONCAWE, The Hague (Netherlands), Special Task Force on the Study of Air Pollution, Sampling, and Survey Techniques

METHODS FOR THE DETERMINATION OF SO2 IN THE ATMOSPHERE. *Rept. 6/73, 54p., Sept. 1973. 95 refs.*

Discontinuous and continuous automated methods for determining airborne sulfur dioxide, sulfates, and hydrogen sulfide are reviewed. The methods include: titration, colorimetry, gas chromatography, flame photometry, conductimetric analyses, coulometry, photometry, and ultraviolet spectrophotometry. Procedures for calibration and the preparation of reference samples are also outlined. Manufacturers specification data are tabulated for automatic field instruments.

1972

53009 **APTIC NO. 77473**

Narain, C., P. J. Marron, and J. H. Glover

THE ANALYSIS OF GASEOUS POLLUTANTS. *Gas Chromatogr. Proc. Int. Symp., vol. 9:1-7, 1972. 4 refs.*

A method of concentrating atmospheric samples of gaseous pollutants in a cryogenic freeze trap for subsequent analysis by gas chromatography is described. Samples can be concentrated up to 200-fold, thus allowing for the analysis of organic compounds that exist at very low concentrations in the atmosphere. A stainless steel tube packed with stainless steel rings and cooled to the temperature of liquid oxygen is used to concentrate pollutants from 50-100 l of atmospheric air. The method is successfully demonstrated for the analysis of such pollutants as aliphatic and aromatic hydrocarbons, halogenated hydrocarbons, esters, ketones, mercaptans, and aldehydes. The limit of detection by the method is of the order of 0.01 pphm. (Author abstract modified)

AIR QUALITY MEASUREMENTS

1975

53010 **APTIC NO. 77498**

Barry, Eugene F., Manuel T. Rei, H. H. Reynolds, and Joseph O Brien

DETERMINATION OF NICKEL AND VANADIUM IN THE ATMOSPHERE OF EASTERN MASSACHUSETTS. *Environ. Letters, 8(4):381-385, 1975.*

The concentration of nickel and vanadium were measured for a 1-year period in ambient atmospheres in Eastern Massachusetts in order that seasonal fluctuations of each element and their concentration trends at sampling locations of varying degrees of urbanization could be determined. The average seasonal distributions of V and Ni during 1972 are tabulated. Both metals show strong seasonal fluctuations that are inversely proportional to the average seasonal, ambient temperature. The winter months exhibit markedly higher concentrations associated with increased fuel consumption in addition to a decrease in concentration with decreasing degrees of urbanization. Nickel concentration in particulates at each sampling site exhibited substantial correlation with V concentration. The intercept of the regression curves associated with each location approaches zero which indicates that atmospheric Ni and V have a common source.

53011 **APTIC NO. 77403**

Brosset, C., K. Andreasson, and M. Ferm

THE NATURE AND POSSIBLE ORIGIN OF ACID PARTICLES OBSERVED AT THE SWEDISH WEST COAST. *Atmos. Environ., 9(6/7):631-642, June/July 1975. 9 refs.*

The particle content of hydrogen ion, ammonium ion, and sulfate ion was measured on the Swedish west coast during the period March 1-Aug. 1973. There are two types of acid particles. The ratio of H ion/SO4 ion concentration is low for the first type. The H ion may be related to the phase (NH4)3H(SO4)2 or to some other acid phases which are found together with the phase (NH4)2SO4. These phases are generated by catalytic oxidation of sulfur dioxide absorbed in the water droplets around the particles. Regarding the second type the relationship H ion/SO4 ion concentration is sometimes close to unity and the H ion can be bound in the phase NH4HSO4. The particles are very small and are formed in an atmosphere with a low concentration of ammonia by photochemical SO2 oxidation in the presence of nitric oxide. During the measuring period the mean value of the particle borne H ion concentration around the sampling site was 8 nmole/cu m. The maximum concentration, measured at 6 hr mean values was 215 nmole/cu m. (Author summary modified)

53012 **APTIC NO. 76754**

Burkhardt, E. G., C. A. Lambert, and C. K. N. Patel

STRATOSPHERIC NITRIC OXIDE: MEASUREMENTS DURING DAYTIME AND SUNSET. *Science, 188(4193):1111-1113, June 13, 1975. 9 refs.*

Balloon measurements of the temporal variation in the nitric oxide concentration at an altitude of 28 km over a complete sunrise- to-sunset cycle (11:00-20:30 Mountain Standard Time) were made. The maximum NO concentration occurred at about 15:00 M.S.T. and was 22 + or - 6 times 10 to the 8 molecules/cu cm. A slow rise in the NO concentration from 11:00-14:00 M.S.T. was attributed to a slow dissociation of nitric anhydride. Within a time period of about 1.5 hr, starting at about 18:00 M.S.TS., the NO concentration dropped from about 20 to less than 3 times 10 to the 8 molecules/cu cm. This drop was associated with the reduction in solar ultraviolet radiation reaching the environs of the balloon because the solar radiation traverses longer and longer paths as the sun is setting. This reduction in solar radiation diminished the NO production rate. The results also supported the role of NO as a catalyst in the destruction of ozone.

53013 **APTIC NO. 77567**

Elliott, Larry P. and Donald R. Rowe

AIR QUALITY DURING PUBLIC GATHERINGS. *J. Air Pollution Control Assoc., 25(6):635-636, June 1975. 7 refs.*

Indoor air samples from three arenas with varying degrees of no-smoking enforcement and different types of ventilation were analyzed for total suspended particulates, carbon monoxide, and benzo(3-4)pyrene. The total suspended particulate levels when the arenas were attended ranged from 148-620 micrograms/cu m as compared with an average background level of 68 micrograms/cu m. Carbon monoxide levels ranged from 7.8-25.0 ppm versus a background level of 3.0 ppm, and benzo(3-4)pyrene levels ranged from 7.1-21.7 nanograms/cu m as compared to a background level of 0.69 nanograms/cu m. The pollutant levels clearly increased with increasing attendance and were consistently higher in poorly ventilated arenas and in those where no-smoking rules were not enforced.

53014 **APTIC NO. 77627**

Gilmore, Timothy M. and Thomas R. Hanna

APPLICABILITY OF THE MASS CONCENTRATION STANDARDS FOR PARTICULATE MATTER IN ALASKAN AREAS. *J. Air Pollution Control Assoc., 25(5):535-539, May 1975. 17 refs.*

High particulate matter concentrations were measured in several communities in Alaska using high volume air samplers. Because of these measurements, Anchorage and Fairbanks are classified Priority I for particulate matter. There are few large point sources of particulate matter in Alaska: the high concentrations that were measured due to entrainment of dust, either by natural means or by man s activities. The mean particle diameter in the Alaskan urban areas is approximately ten times that found in major metropolitan areas. The mean particle size increases with increasing mass concentration in those areas. Particulate matter concentrations in Alaska are highly dependent on natural phenomenon. The COH meter readings do not correlate with high volume air sampler measurements in Alaska. Combined sulfur dioxide and particulate matter data indicate little evidence of possible health hazard as defined in Air Quality Criteria for Particulate Matter. A possible method for relating high volume air sampler data to ambient air particulate matter standards based on size distribution was developed. (Author abstract modified)

53015 **APTIC NO. 77372**

Hosokawa, Y., S. Izumi, M. Chinda, T. Yoshida, H. Ohno, H. Sawa, T. Seki, S. Hayakari, M. Suzuki, and T. Narita

ON THE ANALYSIS OF DUST FALL AT HACHINOHE AREA. *(Hachinohi chiku ni okeru koka baijin no kaiseki). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rep. Environ. Pollut. Control Cent. Aomori Prefect.), no. 1:33-45, Feb. 1975. 3 refs.*

Data of falling particulate quantity measured continuously since June 1965 in the Hachinohe area (presently at 12 points) were analyzed. Concentrations of sulfate ion, chlorine ion, and calcium ion in soluble components and zinc, vanadium, cadmium, lead and manganese in insoluble components were determined. Significant correlation was found between precipitation and soluble components, while that between precipitation and insoluble components was less significant. Yearly and seasonal variations of total quantity and insoluble components are given with a description of characteristics. The relationship between total quantity and frequency of wind direction was analyzed, and regional representability of total quantity was examined by the average value, standard deviation, and correlation matrix. The yearly variation in pH and regional representability of pH were also analyzed by average value, dispersion value and correlation matrix. The yearly and seasonal variations in soluble components, the relationship between total quantity and soluble components, and the relationship between the frequency of wind direction and soluble components were also analyzed.

53016 **APTIC NO. 77373**

Hosokawa, Y., S. Izumi, M. Chinda, M. Suzuki, T. Narita, M. Ito, and H. Sawa

HEAVY METAL POLLUTION AT HACINOHE AREA. *(Hachinohe chiku ni okeru jukinzoku osen (Dai 1 po)). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rep. Environ. Pollut. Control Cent. Aomori Prefect.), no. 1:46-54, Feb. 1975. 1 ref.*

The present status of heavy metal pollution in Hachinohe City was investigated. Data of particulate concentration (120-278 micrograms/cu m) and concentrations (micrograms/cu m) of iron (4.06-13.0), zinc (0.63-2.13), manganese (0.01-0.51), lead (0.11-0.33), copper (0.06-0.11), nickel (0.04-0.12), and cadmium (0.003-0.012) of samples collected using high volume air sampler during the period 1971-1973 are compiled. The relationship between particulate concentration and each heavy metal concentration was analyzed, and correlation coefficients were obtained. Significant correlation was found in cases of Fe and Mn and correlation with Zn and Ni was less significant. The relationship between distribution of heavy metal and wind direction and velocity was analyzed, which indicated a marked effect of wind direction producing higher pollutant concentration in the down-wind area. Data of heavy metal concentrations in sample collected by low volume air sampler during 1973 and in soil sample are also compiled.

53017 **APTIC NO. 77506**

Hosokawa, Y., S. Izumi, M. Chinda, T. Seki, T. Yoshida, S. Hayakari, M. Suzuki, T. Narita, H. Sawa, H. Ohno, and H. Hiraide

ANALYSIS OF SO2 CONCENTRATIONS IN THE HACHINOHE AREA. *(Hachinohe chiku ni okeru SO2 nodo no kaiseki). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rept. Environ. Pollut. Control Cent., Aomori Prefect.), no. 1:17-24, Feb. 1975. 4 refs.*

Results of sulfur dioxide measurements at 8 locations with automatic analyzers and at 22 locations by the lead peroxide candle method were given. High concentrations (average hourly concentration higher than 0.1 ppm) occurred when a NW wind prevailed. Both the geometric average concentration of SO2 and the total number of hours with high SO2 concentration decreased from 1972 to 1974. A total of 242 hours (34.3%) in February 1972 showed high SO2 concentrations (more than 0.1 ppm). More than 95% of the high concentrations occurred at wind directions of W, WNW, NW and NNW. The total number of hours with high SO2 concentration in February 1973 and 1974 were significantly reduced to 19. The SO2 concentration in the city decreased in general from 1972 to 1973, with the exception of the second Fish Market where the concentration was still considered to be high.

53018 **APTIC NO. 77509**

Hosokawa, Y., S. Izumi, M. Chinda, M. Suzuki, and J. Oyamada

INVESTIGATION REPORTS ON TRAFFIC POLLUTION. *(Kotsu kogai chosa hokoku). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rept. Environ. Pollut. Control Cent., Aomori Prefect.), no. 1:65-71, Feb. 1975. 1 ref.*

Investigations were conducted from 1971 to 1974 at Hachinohe City, Towada City, Misawa City and Okuirise City using air pollution monitoring vehicles. Sulfur dioxide was determined by the p-rosaniline method and nitrogen oxides by the Saltzman method. Carbon monoxide was measured by Kitakawa detector tube, while lead was analyzed by the atomic absorption method. The 4-yr average SO2 concentrations at Mikka-cho and Muika-cho of Hachinohe City were as high as 0.035 ppm and 0.032 ppm, respectively. The SO2 concentration at the Inayo-cho intersection of Towada City ranged from 0.008 ppm on July 18, 1973 to 0.023 ppm on June 13, 1972. The SO2 concentrations at Misawa and Okuirise were generally lower. Hachinohe City also showed the highest NO, NO2, and CO concentrations. The average NO and NO2 concentrations at Mikka-cho were 0.170 ppm and 0.049 ppm, respectively, while the average CO concentrations at Mikka-cho and Muika-cho were 10.1 ppm and 7.5 ppm, respectively. The average lead concentrations at Hachinohe and Towada cities were 0.7-1.2 micro g/cu m.

53019 **APTIC NO. 77512**

Hosokawa, Y., S. Izumi, M. Chinda, T. Seki, T. Narita, and H. Ohno

ON THE FLUORIDE CONTAMINATION AT HACHINOHE AREA. *(Hachinohe chiku ni okeru fukkabutsu osen ni tsuite). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rept. Environ. Pollut. Control Cent., Aomori Prefect.), no. 1:60-64, Feb. 1975.*

Toyo number 526 filter papers treated with 30% sodium carbonate solution were used to collect fluorides in the air at 22 locations throughout the city and number 51A papers treated with 1% Na2CO3 were fixed in a multi-stage low-volume sampler to collect fluorides in the flue gas from polluting sources. The average fluoride concentration in August 1974 ranged from non-detectable at the Musu primary school to 60 micro g/100 sq cm/month at Miyazaki-taku. The average concentration in September ranged from non-detectable at 6 locations to 183 micro g/100 sq cm/month at Miyazaki-taku, that in October from non-detectable at 5 locations to 98 micro g/100 sq cm/month at the second fish market and that in November from non-detectable at 6 locations to 1974 micro g/100 sq cm/month at the Second Fish Market. The fluoride concentration at the polluting sources ranged from non-detectable in the flue gas of the electric furnace at Hachinohe Steel Works to 5.9 mg/N cu m in the flue gas of an electric furnace at the Taiheyo Metal Company.

53020 **APTIC NO. 77489**

Kitagawa, Yoshio, Akira Furukawa, Akio Sueda, Masatoshi Ito, Chozo Furutani, Kan Ryomi, Toshibumi Hayata, and Yasunobu Sadakane

ENVIRONMENTAL AMOSPHERIC INVESTIGATION AT MINE CITY REGION, PART 2. *(Mine chiku kankyo taiki chosa seiseki ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 16:72, March 1975.*

The air pollution in Mine city was investigated for sulfur dioxide and airborne dusts. The city has several cement industries and limestone quarries, and it is surrounded by mountains. The SO2 was analyzed by colorimetry (pararosaniline) and the airborne dusts were collected by a high volume air sampler for analyses of calcium, magnesium, iron, manganese, lead, copper, nickel, cadmium, chromium, cobalt, sulfate ion, nitrate ion, chloride ion, and benzene soluble organic matter. The areal SO2 pollution was low considering the amount of heavy oil combustion by the areal industries (253,000 tons/yr) and the daily average value of SO2 was 0.002 to 0.003 ppm with a maximum 1 hr average of 0.023 ppm. No localized high SO2 pollution was observed in the city. The airborne dusts collected from 10 areal stations generally ranged from 100 to 200 micrograms/cu m, but 430 micrograms/cu m was observed from one station. The calcium content in airborne dust was very high and the average calcium found was 18 micrograms/cu m. The cadmium level was also high compared to other cities and was 0.006 micrograms/cu m. The nitrate ion and sulfate ion levels were, however, low. No apparent wind effect on the areal pollution was observed because of the unique geographical location of the city.

53021 **APTIC NO. 77422**

Machii, Hiroaki

ENVIRONMENTAL POLLUTION IN KAWASAKI. POLLUTION OF SURFACE SOILS AND SLUDGE BY HEAVY METALS AND POLLUTION OF RAINWATER. *(Kawasaki no kogai-hyomendojo. Hedoro no junkinzoku osen to amamizu no osen jittai). Text in Japanese. Preprint, the Society for General Research on Environmental Science, Tokyo (Japan), p. 142-143, 1975. (Presented at the Preparatory Meeting of the Society for the General Research on Environmental Science, the Lecture Meeting, 1st, Tokyo, Japan, June 6-8, 1975.)*

Samples of surface soils in the northern and southern parts of Kawasaki were collected and analyzed by atomic absorption spectroscopy. The highest lead concentration was found in the soil near the toll gate of the Tomei Highway, where the concentration reached 789 ppm. The zinc concentration at the same place was 1380 ppm. The lead, zinc, cadmium, copper, and chromium concentrations were determined at 10 places. The lead content was almost proportional to the zinc concentration. The sludge at the bottom of Kawasaki Harbor were collected at 12 different places. The highest pollution was found at the waste water discharge gate of the Showa Electric Co., where the lead and zinc concentrations were as high as 2280 and 4080 ppm, respectively. The rainwater was collected on July 1 and 4, and on November 17, 1974. A gravimetric determination of sulfate and chloride ions was made. The sulfate ion concentration ranged from 6 to 10 ppm in rainwater on July 1.

53022 **APTIC NO. 77570**

Miyazaki, Ichiro

AIR POLLUTION INVESTIGATION IN HEAVY CHEMICAL INDUSTRIES IN THE KEIHIN AREA. (PART 1). MONITORING REPORT ON THE CONCENTRATION OF SULFUR OXIDES. *(Keihin jukagaku kogyo chitai shuhen no taiki osen chosa (Dai 1 po). Iou sankabutsu nodo no sokutei kekka). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo (Japan), p. 60-61, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

The sulfur oxides concentration was measured by the alkali filter paper method at the homes of Hosei High School students living within a one hour commuting distance. The alkali filter papers were left standing for 30 days in January and August, from 1970 to 1974, when they were collected and analyzed. Questionnaires on pollution-related health problems were answered by parents. The average SOx concentrations (10 measurements in five years) were 0.044 ppm in January (1927 measurement points) and 0.053 ppm in August (2451 measurement points). The SOx concentration was higher in August, except in 1972. Kawasaki city showed the highest SOx concentration (0.046 ppm in January and 0.061 ppm in August) followed by the southern part of Tokyo (0.046 ppm in January and 0.057 ppm in August). Daishi district located at the southern part of Kawasaki city showed the highest value (0.080 ppm) followed by Tajima district (0.077 ppm). The yearly variation in SOx concentration in Kawasaki showed a decreasing tendency from 0.089 ppm to 0.048 ppm at Daishi in 1972 and 1974, and 0.102 ppm to 0.05 ppm at Tajima in 1972 and 1974. The results obtained by the alkali filter paper method were compared with the data obtained by the lead peroxide candle method and the electroconductivity method.

53023 **APTIC NO. 77520**

Schneider, Willi, Lothar Matter, and Erich Jerrmann

BENZPYRENE CONCENTRATIONS OF THE AIR OF AN INDUSTRIAL AREA. *(Benzpyrengehalte der Luft eines Ballungsgebeites). Text in German. Forum Umwelthygiene, 1(9):273-276, 1975. 9 refs.*

Twenty sampling examinations of the air of Duisburg showed that the benzopyrene contents of the air differed considerably in various parts of the town. The emission sources included industry, households, and traffic. The proportions of the single emitters differed in various parts of the town. The concentrations were so high that accurate determination and continuous measurement of these toxic agents are compulsory.

53024 **APTIC NO. 76770**

Schulze, H. D.

MEASURING FORMALDEHYDE CONCENTRATIONS IN ENCLOSED SPACES. *(Formaldehyd-Konzentrationsmessungen in geschlossenen Raeumen). Text in German. Z. ges. Hyg. Ihre Grenzgebiete (Berlin), 21(4):311-314, 1975. 10 refs.*

The maximum allowable emission concentration for formaldehyde in the German Democratic Republic is 0.035 mg/cu m. The maximum allowable 24-hr concentration is 0.012 mg/cu m. The formaldehyde concentration in a 35 cu m room furnished with a plastic wardrobe 3.50 m long and 2 m high, manufactured three or four months prior to the measurements, reached 0.242 mg HCHO/cu m three hours after closing the window. Excessively high formaldehyde concentrations were also measured in the rooms of a dormitory whose furniture had been manufactured one a half yr previously. The concentrations measured in a textile shop ranged from 0.214 to 0.371 in winter and up to 1 mg/cu m in summer. The highest concentration of 1.67 mg/cu m, which nearly approached the maximum allowable working area concentration of 2.0 mg/cu m, was measured in a textile warehouse.

53025 **APTIC NO. 76763**

Seiller, W.

DIURNAL AND WEEKLY FLUCTUATIONS OF THE SULFUR DIOXIDE CONCENTRATION IN AND AROUND VIENNA. *(Ueber taegliche und woechentliche Schwankungen der Schwefeldioxidkonzentration im Raum von Wien). Text in German. Radex Rundschau (Austria), 1975(2):398-403, 1975. 7 refs.*

During the period from October 1969 to March 1973, sulfur dioxide levels were continuously monitored in the Vienna with an Ultragas U3S unit operating according to the conductivity method. From this, standardized daily curves were derived. Generally, the daily maximum occurs in late morning, with a second relative maximum in the evening. The highest daily deviations appear at the measuring points in the densely occupied areas. The months with the highest sulfur dioxide-load (December and January) showed the highest deviation of the daily means. Off-work days showed slightly lower averages than working days. The diurnal averages measured in the summer months in the Vienna area ranged from 0.01 to 0.06 mg SO_2/cu m and from 0.03 to 0.21 mg SO_2/cu m in the winter months. In the center of Vienna, the diurnal averages ranged from 0.01 to 0.19 mg SO_2/cu m in summer and from 0.11 to 0.48 mg SO_2/cu m in winter.

53026 **APTIC NO. 77628**

Willeke, Klaus and Kenneth T. Whitby

ATMOSPHERIC AEROSOLS: SIZE DISTRIBUTION INTERPRETATION. *J. Air Pollution Control Assoc., 25(5):529-534, May 1975. 13 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 1974, Paper 74-262.)*

Measurements made with the Minnesota Aerosol Analyzing System in Denver, near Denver, and near Ft. Collins, Colo., are analyzed in relation to other several thousand size distributions measured in the other parts of the United States. The size distributions are multimodal. The Aitken nuclei range mode is a measure of freshly produced aerosols, the accumulation range mode indicates the degree of aerosol aging and the coarse particle mode gives information on the amount of windblown dust, sea spray, or mechanically produced aerosols such as fly ash. Air environments can be categoried into four kinds of backgrounds: clean continental, average content continental, urban district, and oceanic. The physical characteristics of these categories may be described by a limited number of parameters such as NT, VT, V3-, and bscat. (Author summary modified)

53027 **APTIC NO. 76889**

Yokohama Municipal Office (Japan) Bureau of Environmental Pollution Control

ACTUAL SITUATION OF AIR POLLUTION: AIR POLLUTION IN THE KEIHIN INDUSTRIAL AREA. *(Taiki osen no jittai: Keihin kogyo chitai no taiki osen). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 17:9-28, Feb. 1975.*

Since 1957 in Yokohama and Kawasaki cities, the falling particulate concentration by the deposit gauge method (dust jar method in Kawasaki since 1971) and sulfur dioxide by the lead dioxide method have been measured. The falling particulate concentrations measured at 32 locations in 1973 are compiled and analyzed. The comparison of data of two cities are difficult because of the difference in measurement methods. The maximum and minimum yearly average concentrations (tons/k sq m/mo) at each measurement location were 16.9 and 3.9 in Yokohama and 41.4 and 6.2 in Kawasaki, respectively. The yearly variation in falling particulate concentration since 1975 has showed a decreasing trend. The SO2 concentrations measured at 65 locations in 1973 are compiled and analyzed. The maximum and minimum yearly average concentrations (mg sulfur trioxide/day/100 sq cm) at each measuring point were 0.98 and 0.08 in Yokohama and 2.67 and 0.34 in Kawasaki. The yearly variation in SO2 concentration since 1961 showed a generally decreasing trend.

53028 **APTIC NO. 76890**

Kanagawa Prefectural Environmental Center (Japan)

VARIATION OF ATMOSPHERIC HEAVY METAL CONCENTRATION IN KANAGAWA PREFECTURE. *(Kanagawa-ken ni okeru taikichi jukinzoku nodonada no henka). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 17:29-48, Feb. 1975.*

In Kanagawa Prefecture, the atmospheric concentrations of heavy metals were measured at 15 locations once a month for 3 yr from 1971 to 1973. The data compiled were analyzed in terms of the regional average of the entire period and the average of the entire region on each measurement date. The average atmospheric concentrations (microgram/cu m) of the entire period were 0.005-0.042 for cadmium, 0.20-0.89 for lead, 0.060-0.36 for manganese, 0.016-0.526 for nickel, 2.7-7.7 for iron, 0.001-0.018 for chromium, 0.001-0.017 for cyan, 0.07-0.42 for fluorine, and 141-259 for suspended particulates. The concentrations at ground level and building tops were compared, and correlation coefficients obtained were 0.90 for Cd, 0.77 for Pb, 0.87 for Mn, 0.82 for Ni, 0.73 for Fe, 0.80 for Cr, 0.73 for cyan, 0.66 for F, and 0.81 for suspended particulates. The correlation coefficients between Mn and Fe concentrations were in the range of 0.35-0.95.

53029 **APTIC NO. 77370**

Arakawa Ward Office

ENVIRONMENTAL POLLUTION IN ARAKAWA WARD. *(Arakawa-ku no kogai). Text in Japanese. 147p., March 1975.*

Environmental pollution data obtained in the Arakawa Ward in 1974 are presented. Data of building permits applied for by factories and specified facilities, permits applied for in accordance with the Tokyo Pollution Control Ordinance and registration in accordance with the Noise Pollution Control Standard are presented. Data on complaints filed, types of complaints, classifications by zone, and type of business are also discussed. Pollution by automobiles by carbon monoxide concentration, traffic volume, and noise was surveyed. The average concentration of nitric oxide was 1.3-7.7 pphm, of nitrogen dioxide, 1.6-5.9 pphm and of sulfur dioxide 0.004-0.036 ppm. The results of an analyses of heavy metals in suspended particulates are given, with data on wind direction and velocity. Data of pollution control funds and loans are also included.

53030 **APTIC NO. 77415**

Kanagawa Prefecture (Japan), Pollution Control Office

AIR POLLUTION ENVIRONMENTAL STANDARDS IN THE KANAGAWA PREFECTURE. *(Kanagawa kenka no taiki osen kankyo kijun tekigo jokyo ni tsuite). Text in Japanese. Kanagawa ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollut. Yokohama-Kanagawa Ind. Area), no. 17:49-58, Feb. 1975.*

Air pollution conditions in the Kanagawa Prefecture have been monitored by automatic detectors since 1964. A monitoring center was established in 1973 with a continuous monitoring telemeter system. Sulfur dioxide showed a peak concentration in 1967 but began to decline in 1968. In 1973, the yearly average concentrations of SO2 at 43 monitoring stations were all below the old environmental standard of 0.05 ppm. The average concentrations ranged from 0.009 ppm at Tsunoda of Aikawa-cho and Sagamidai Junior High School to 0.045 ppm at the Tajima Health Center. The environmental standard was changed to 0.018 ppm and only 12 stations showed an average concentration which conformed to the new standard. The oxidant concentrations at 29 stations ranged from 0.024 ppm at Sagamidai to 0.04 ppm at the Takatsu Municipal Office, none of which conformed to the environmental standard. The highest nitric oxide and nitrogen oxides concentrations were 0.043 ppm and 0.045 ppm, respectively, while the lowest were 0.010 ppm and 0.021 ppm, respectively. The carbon monoxide concentrations ranged from 2.8 ppm to 1.0 ppm at 25 locations, all of which conformed to the environmental standard.

1974

53031 **APTIC NO. 76893**

Hashiguchi, T., H. Matsumoto, T. Kumamoto, S. Matsumoto, and N. Izumo

DETERMINATION OF SULFUR OXIDES BY LEAD DIOXIDE METHOD. *(Nisankaen-ho ni yoru iou sankabutsu no sokutei). Text in Japanese. Kagoshima-ken Kogai Eisei Kenkyusho-Ho (Rep. Kagoshima Prefect. Inst. Pollut. Pub. Health), no. 10:108, Aug. 1974.*

The measurement results of atmospheric sulfur oxides levels by the lead dioxide method at 27 locations in Kagoshima Prefecture are summarized. The lead dioxide was coated on a cotton cloth, which was then exposed to the atmosphere. After one month exposure, the formed sulfate ion was determined by gravimetry. The areas having pulping factories and fish processing factories showed higher SOx levels than the areas without these factories. The SOx level found in the former areas and latter areas ranged from 0.123 to 0.406 sulfur trioxide/day/sq cm 100 PbO2, and 0.033 to 0.079 SO3/day/sq cm 100 PbO2 in 1973 respectively. Also the level of population seemed to affect the SOx pollution, and a higher SOx level was found inn more populated areas. The SOx level in winter was higher than that in summer. The average of 27 locations for the day s average in August and February was 0.115 and 0.203 SO3/day/cu cm 100 PbbO2 respectively.

53032 **APTIC NO. 77515**

Noma, M., J. Takeuchi, S. Shibata, T. Takanashi, K. Sato, Y. Hoshika, S. Kadowaki, K. Nakamura, and K. Koike

REMOTE-SENSING MEASUREMENT USING A BARRINGER CORRELATIVE SPECTROMETER. PART I. DISTRIBUTION OF AIR POLLUTANTS IN THE UPPER AIR OF NAGOYA CITY. *(Barringer sokan supekutoro meta ni yoru enkaku sokutei (Sono 1): Nagoya-shi jyoku no taiki osen). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Rept. Environ. Pollut. Res. Cent., Aichi Pref.), no. 2:11-16, 1974. 6 refs.*

The relative concentration of nitrogen dioxide in the upper atmosphere of Nagoya City was surveyed on March 22, 1972 using a helicopter loaded with a Barringer nitrogen dioxide/sulfur dioxide correlative spectrometer Cospec. The distribution of the relative concentration of NO2 at altitudes of 300 m, 500 m, and 700 m was correlated with the environmental concentration. Air pollutants in the upper atmosphere were also sampled by impinger and sampling bags at the front and the ventral parts of the helicopter. The oxidant concentrations ranged from 0.004 to 0.007 ppm with no apparent difference at different altitudes. The NO2 concentration in air sampled at the front was 0.012-0.028 ppm while that in the air sampled at the ventral part was 0.031-0.084 ppm, approximately three times higher. The higher concentration in air sampled at the ventral part was due to the contribution of the engine exhaust gas. The carbon monoxide concentration ranged from 5.1 ppm at 700 m to 6.5 ppm at 500 m, indicating a high carbon monoxide concentration at high altitudes compared to the ground concentration. Some problems of remote-sensing measurement of air pollution by correlative spectrometer are also discussed.

53033 **APTIC NO. 77584**

Noma, M., S. Shibata, and T. Nakaya

REMOTE SENSING MEASUREMENT USING A BARRINGER CORRELATIVE SPECTROMETER. PART II. CONTRIBUTION OF TRAFFIC EXHAUST GASES TO AIR POLLUTION BY NO2/SO2 CORRELATIVE MEASUREMENT. *(Barringer sokan superkuroro meta ni yoru enkaku sokutei (Sono 2): NO2/SO2 sokan sokutei ni yoru kotsu haigasu no taiki e no kiyo ni tsuite). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Rep. Environ. Pollut. Res. Cent., Aichi Pref., no 2:17-20, 1974. 3 refs.*

Correlative concentrations of sulfur dioxide and nitrogen dioxide in the air of Nagoya City were measured using a Cospec II. The Barringer correlative spectrometer was loaded on a light van which made a round trip of 72 km in the city for 151 min. The concentrations at the 48 points along the route were plotted. The SOx concentrations on the southward trip remained almost constant at about 30 ppm M until the Kasaderanishimon but began to increase to a maximum of about 150 ppm M at Shin Nittetsu. The SO2 concentrations showed peak values at the Nawa interchange, the Asakura interchange and Oe. The NO2 concentrations on the southward trip increased from about 10 ppm M at Yada 10-chome to about 35 ppm M at Kitagashira and to about 50 ppm M at Shin Nittetsu. The high NO2/SO2 ratios were found at points where traffic was heavy.

53034 **APTIC NO. 76793**

Environmental Agency (Japan), Air Pollution Control Div.

PRESENT SITUATION OF AIR POLLUTION IN JAPAN, 1974. *(Nippon no taiki osen jyokyo, showa 49 nenban). Text in Japanese. 990p., Dec. 1974.*

Air pollution data for Japan collected by more than 1000 monitoring stations in 1973 are presented for sulfur dioxide, nitrogen oxides, oxidants, hydrocarbons, carbon monoxide, airborne dust, and sedimented dust. The sulfur dioxide pollution has been decreasing every year, and the SO2 yearly averages of 16 typical monitoring stations in large cities and industrial areas were 0.051, 0.44, 0.038, 0.032, and 0.030 ppm from 1969 through 1973, respectively. Among the 641 SO2 monitoring stations, 62 stations observed increased SO2 yearly averages and 148 stations observed decreased SO2 yearly averages from 1972 to 1973; the rest of the stations reported similar levels between 1972 and 1973 (within 0.004 ppm). The SO2 yearly averages of 22 stations which recorded higher SO2 levels ranged from 0.047 to 0.037 ppm in 1973 and 0.058 to 0.040 ppm in 1972. The yearly averages of nitrogen dioxide for seven stations in seven major cities has been increasing every year; and the values were 0.0227, 0.0229, 0.0250, 0.0253, 0.0283, and 0.0293 ppm from 1968 through 1973, respectively. A slight decrease in nitric oxide pollution for the past 3 yr was observed at most of the NO monitoring stations. The NO yearly averages at 28 stations in 1971, 1972, and 1973 were 0.0294, 0.0277, and 0.0259 ppm, respectively. The number of oxidant monitoring stations has been rapidly increasing with the importance of photochemical smog control, and there were 349 stations in 209 cities. Higher oxidant levels were recorded by 20 monitoring stations, with the yearly average being 0.050 to 0.040 ppm oxidant. Hydrocarbon levels observed at 10 monitoring stations ranged from 2.0 to 1.26 ppm (equivalent methane) for the yearly average.

53035 **APTIC NO. 77508**

Iwakuni Municipal Office (Hiroshima Prefecture, Japan), Div. of Social Welfare

AIR POLLUTION. *(Taiki osen). Text in Japanese. Iwakuni-shi no kogai gaikyo (Summ. Environ. Pollut., Iwakuni City), no. 6:96-137, Dec. 1974.*

Air pollution conditions in Iwakuni city were monitored at 9 monitoring stations, and 21 locations where sulfur oxides were measured by the lead peroxide candle method, and 13 locations where particulates concentrations were determined by the deposit cage method. The average SOx concentrations in 1973 measured by the lead peroxide candle method ranged from 0.17 mg sulfur trioxide/day/100 sq cm at the Miso Office to 0.58 mg SO3/day/100 sq cm at Mitsui Sekiyu Shataku. The average SOx concentrations measured by the conductivity method ranged from 0.021 ppm at Kazuki Kominkan to 0.037 ppm at the Higashi Fire Department. Only 58% of a total of 264 measurement days gave hourly average concentrations below the environmental standard of 0.04 ppm at the Higashi Fire Department. The average airborne particulate concentrations ranged from 0.050 mg/cu m at Totsu Kominkan to 0.056 mg/cu m at the Higashi Fire Department. The average nitrogen oxides concentrations measured by the Saltzman method ranged from 0.007 ppm to 0.061 ppm. The average oxidant concentrations at the Iwakuni Municipal Office and Kazuki Kominkan were 0.028 ppm and 0.037 ppm, respectively.

1973

53036 **APTIC NO. 76880**

Saito, K., M. Mizobuchi, and M. Okamoto

INVESTIGATION OF SULFURIC ACID MIST. *(Ryusan misuto no chosa ni tsuite). Text in Japanese. Nara-ken Eisei Kenkyusho Nenpo (Annu. Rep. Nara Prefect. Inst. Public Health), no. 8:140, 1973.*

Sulfuric acid mist concentration was determined and its correlation with oxidant level and sulfur oxides level considered. The sulfuric acid mist was trapped on a filter paper for 8 hr using a low volume air sampler at 30 l/min sucking spread. The determination was made both in summer and winter. The average level of sulfuric acid mist in summer and winter was 10.5 and 2.6 micrograms/cu m respectively. During the same periods, both oxidant level and SOx level were also measured. The average oxidant level in summer and winter was 64 and 36 ppb, and the average SOx level in summer and winter was 37 and 81 micrograms/ cu m respectively. A strong correlation of sulfuric acid mist level with oxidant and SOx levels was observed in summer and their correlation factors were 0.889 and 0.669 respectively. The correlation in winter was very poor and their correlation factors were -0.020 and 0.342 respectively. Although higher SOx levels were found in winter, lower sulfuric acid mist resulted. Therefore the formation of sulfuric acid mist would be relating to the amount of oxidant in the atmosphere.

53037 APTIC NO. 76896

Saito, K., M. Mizobuchi, and M. Okamoto

SUSPENDED PARTICULATE. *(Fuyu funjin chosa ni tsuite). Text in Japanese. Nara-ken Eisei Kenkyusho Nenpo (Annu. Rep. Nara Prefect. Inst. Public Health), no. 8:144, 1973.*

The composition of airborne dusts collected in Nara Prefecture is determined, and the correlations between airborne dust constituents and total dust concentration are obtained. The airborne dusts were collected on a glass fiber filter using a high volume air sampler for 24 hr. The analytical methods used were turbidimetry for sulfate ion, the 2,4-xylenol method for nitrate ion, and atomic absorption spectrometry for metals. The total dust amount ranged from 201 to 55 micrograms/cu m air with the average amount 116 micrograms/cu m air. The dusts contained an average of 9.23% sulfate ion and 2.93% nitrate ion. The benzene soluble components were 7.95% of the total dust weight collected. The amounts of zinc, lead, copper, manganese, and cadmium were all less than 0.3% of the total dust weight. Iron was the richest metal component found in the airborne dusts and its average amount was 2.64%. The correlation between the pollutant concentration and the total dust amount was high for iron, lead, and manganese, and their correlation factors were better than 0.8.

1972

53038 APTIC NO. 77585

Nagano, T., A. Hattori, T. Nagai, Y. Ukishima, Y. Nakai, and I. Iwasaki

SURVEY ON THE METAL CORROSION BY AIR POLLUTION: EFFECTS OF GLAUBER S SALT ON METALS. *(Taiki osen ni yoru kinzoku fushoku chosa (Dai 2 ho): Bosho no kinzoku ni oyobosu eikyo). Text in Japanese. Shizuoka-ken Eisei Kenkyusho Nenpo (Annu. Rep. Shizuoka Pub. Health), no. 16:217-226, 1972. 4 refs.*

Iron, aluminum, copper, zinc, and silver plates of given sizes were fixed to supporters and exposed to sulfate at 6 locations at Yoshihara of Toyama City where pollution by sodium sulfate was significant. Sulfur dioxide concentrations were measured by the lead peroxide candle method while particulate concentrations were measured by the deposit cage method. The metal plates were weighed before and after the exposures. The average SO_2 concentrations from July 1971 to May 1972 ranged from 0.867 SO_3 mg/100 sq cm/day at Kashiwara-Arada to 1.202 SO_3 mg/100 sq cm/day at the Fujima T-house. The sodium sulfate concentrations in the air were estimated at 4.29 sq km/month at Kashiwara-Arada. The iron plates showed considerable weight decreases at all the locations. A correlation coefficient (r) of 0.997 was obtained between the weight decrease of iron and the estimated Na_2SO_4 concentration in the air. Silver plates showed black-blue spots after exposure.

53039 APTIC NO. 77485

Takahashi, R. and T. Watanabe

ON THE RESULT OF MONITORING OF BIFLUORIDE IN KANABARA AREA IN 1972. *(Showa 47 nendo Kanbara chiku fussoka suiso kanshi kekka ni tsuite). Text in Japanese. Shizuoka-Ken Kogai Boshi Senta Nenpo (Bull. Environ. Pollut. Contr. Res. Center Shizuoka Prefect.), no. 2:92-95, 1972.*

Hydrogen fluoride gas emitted from the Kanbara Plant, Nippon Light Metal Company is damaging agricultural products such as tangerines. Monitoring of the HF concentration in the atmosphere was conducted at nine locations, and accumulated HF was measured at 38 locations. The rain water pH soluble fluorine, and dust were measured at five locations. The accumulation of fluorine in tangerine leaves was measured at 14 locations. Wind direction and velocity were measured at two spots. During 1972, HF pollution decreased by 22%, and the fluorine concentration in tangerine leaves decreased by about 14%. More than 1.5 km from the pollution source the HF concentration in the area was 5 micrograms/100 sq cm/day. The fluorine content of tangerine leaves (new leaves, collected in October) was approximately 100 ppm. The correlation between the amount of fluorine contained in tangerine leaves collected in October and the results of HF measurements indicated that the fluorine in the leaves was mostly due to HF in the atmosphere. Although fluorine ion dissolved in rain water, it did not affect the pH. About thirteen times as much fluorine ion was detected at areas near the pollution source as compared to those more distant from the source.

1969

53040 APTIC NO. 77394

Ministry of Health and Welfare, Fukuoka Prefecture

INVESTIGATION OF AMBIENT AIR IN THE KITA-KYUSHU AREA. *(Kitakyushu chiku kankyo taiki chosa). Text in Japanese. 176p., March 1969.*

An investigation performed during December 3 through 12, 1968, which dealt with the actual state of air pollution and meteorological methods for the prevention of pollution caused by the development of new factories in the Kita Kyushu area is discussed. Twenty-one measuring points were chosen along the Dokai Bay in three districts (Tobata, Yahata, Wakamatsu) in Kita Kyushu City. Sulfur dioxide concentration per day and hour were measured by the colorimetric analysis and the electroconductivity method. The concentration of suspended dust per day (measured by a high volume air sampler) and hour was measured by the filter tape and the light scattering methods. Components of the suspended dust, and general daily meteorological conditions were examined. Wind direction and wind velocity per day and hour were measured at various measuring points. In addition, the general condition of smoke emission sources and of fuel consumption at principal emission sources were reported.

ATMOSPHERIC INTERACTION

1975

53041 APTIC NO. 76895

Abe, Masakatsu

AIR POLLUTION MONITORING SYSTEM. *(Taiki osen o mizen boshi suru shisutemu). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 4(9):43, Sept. 1975.*

The Air Pollution Monitoring System (APMS) has been projected since 1971 to forecast 1 to 3 hr sulfur oxides pollution at large scale industrial areas. The progress and characteristics of the APMS project are discussed. The APMS utilizes computers to forecast in advance the SOx pollution based on the meteorological data and emission data. The basic research was conducted at the Kashima Coastal Industrial Area, Ibaragi Prefecture. The research group consisted of four major groups; the field research, meteorological research, diffusion research, and system research groups. These groups gathered necessary data to perform the SOx simulation analysis at Kashima, and the actual experimental operation is scheduled for June 1975. Thirty environmental monitoring stations and 22 emission sources will participate in the input of SOx data which are transferred by a telemetry system to the control center. The theoretically forecasted SOx pollution is expected to agree with the actual SOx pollution with accuracy better than 90%. Upon the collection of operational data, the APMS is intended to expand its use to other Japanese industrial areas. Also intended is the forecasting of nitrogen oxides pollution.

53042 **APTIC NO. 77499**

Basuk, J.

FREONS AND OZONE IN THE STRATOSPHERE. *Bull. Am. Meteorol. Soc., 56(6):589-592, June 1975. 7 refs.*

The tropospheric sources of freons and ozone in the stratosphere are discussed. Possible natural sinks for freons include: the oceans, the earth itself, various fauna and flora, and particulate matter in the troposphere (either liquid or solid). Freons may contribute to an aerosol effect which, in turn, may lead to a greenhouse effect. Meteorology is of great importance because of the extensive influence of atmospheric winds on the lower half of the atmospheric ozone, thus also affecting the introduction of freons into the stratosphere. (Author conclusions modified)

53043 **APTIC NO. 77552**

Cess, Robert D.

GLOBAL CLIMATE CHANGE: AN INVESTIGATION OF ATMOSPHERIC FEEDBACK MECHANISMS. *Tellus (Uppsala), 27(3):193-198, 1975. 11 refs.*

Simple radiation flux calculations are used to investigate two possible atmospheric feedback mechanisms, cloud altitude and lapse tropospheric lapse rate, in connection with global climatic changes associated with atmospheric particulate matter. Global energy balance is quite insensitive to tropospheric lapse rate, thus eliminating this as a possible feedback mechanism. Cloud altitude, on the other hand, appears to be quite important. A three-layer cloud model and comparisons of calculated and empirical outgoing flux results suggest that cloud temperatures should be held constant when considering variations in surface temperature as opposed to conventional assumptions of fixed cloud altitudes. The resulting dependence of cloud altitude on surface temperature produces a strong positive feedback. (Author abstract modified)

53044 **APTIC NO. 76831**

Dilger, H. and K. Nester

CREATION AND COMPARISION OF VARIOUS SCHEMES FOR DETERMINATION OF DISPERSION CATEGORIES. *(Aufstellung und Vergleich verschiedener Schemata zur Bestimmung von Ausbreitungskategorien). Text in German. Meteorol. Rdsch., 28(1):12-17, March 1975. 10 refs.*

Five systems for the determination of diffusion categories based on meteorological measurements made at the Karlsruhe Nuclear Research Center are described. The selection of categories was based on the standard deviation of vertical wind direction fluctuations (sigma phi). The other systems were adapted to this classification. Evidence of their reliability with regard to sigma phi was based on correlation studies. Systems derived from the standard deviation of horizontal wind direction fluctuations or from the temperature gradient and the wind speed are also appropriate for classifying particular situations. However, systems based on net radiation and the wind speed of the exponent of the wind profile can be used only in statistical investigations.

53045 **APTIC NO. 76765**

Galindo, Ignacio, Agustin Muhlia, and Amando Leyva

ATMOSPHERIC TURBIDITY AND SKY RADIATION AT MARITIME ENVIRONMENTS: GULF OF MEXICO AND TROPICAL ATLANTIC. *Beitr. Physik Atmosphaere, 48(2):168-184, 1975. 25 refs.*

As a preparation for the analysis of the GATE radiation data, some preliminary results on atmospheric turbidity and absorption of solar radiation obtained in tropical maritime environments are reported. Under hazy conditions, diffuse radiation increased up to 271 mly/min for the main turbidity coefficient beta average 0.210, and a mean aerosol transmission function of 0.53. For a humid atmosphere, Rayleigh scattering was about 139 mly/min. The absorption of solar radiation was about 12.3% of the solar constant from which 10.0%, 1.6%, and 0.6% corresponded to water vapor, ozone, and carbon dioxide, respectively. Previously developed numerical methods were applied to analyze the actinometric radiation field. A complete discussion of the possible instrumental and observational errors and their correction is presented.

53046 **APTIC NO. 77551**

Giles, C. H., S. D. Forrester, and B. J. Hojiwala

ADSORPTION AND CATALYSIS AT THE SOLID/SULFUR DIOXIDE INTERFACE IN THE ATMOSPHERE. AN EXAMINATION OF STATISTICAL DATA. *J. Colloid Interface Sci., 50(3):588-601, March 1975. 69 refs.*

Regression lines are computed from sulfur dioxide and smoke data from residential and industrial areas in Great Britain obtained during one winter and one summer month. A large deficiency in the concentration of sulfur dioxide relative to smoke which is of very high statistical significance is observed for data obtained during the winter in comparison with summer measurements. The deficiency does not appear to be due to the increase in domestic smoke during the winter. Adsorption of SO2 is suggested to occur on solid particles followed by its catalytic oxidation by oxygen to sulfur trioxide. The amount of SO2 to be accounted for is far too high to be explained by simple adsorption on smoke particles. The catalysis may be due to traces of metals. The mechanism of SO2 removal becomes less effective as the amount of smoke increases, possibly as a result of the progressive covering of the very active surface of natural inorganic dust by less catalytically active smoke particles. (Author abstract modified)

53047 **APTIC NO. 77568**

Harrison, R. M., R. Perry, and R. A. Wellings

LEAD AND CADMIUM IN PRECIPITATION: THEIR CONTRIBUTION TO POLLUTION. *J. Air Pollution Control Assoc., 25(6):627-630, June 1975. 19 refs.*

Rain samples collected at six sites in the London area and at one rural site for comparison purposes were analyzed for lead and cadmium which in turn were related to local sources of air pollution. The mean lead concentrations of precipitation samples collected around the city ranged from 0.106-0.367 micrograms/ml as compared with 0.025 micrograms/ml for the rural site. Cadmium concentrations for urban samples ranged from 0.006-0.037 micrograms/ml (mean) as compared with 0.032 micrograms/ml (mean) for the rural site. The levels were related to various industrial emission sources as well as motor vehicle traffic. Atmospheric precipitation appeared to be a far more important source of cadmium addition to the soil at urban and suburban areas than dustfall or fertilizer.

53048 **APTIC NO. 77560**

Hayashi, Masayasu

MEASUREMENT OF THE VARIATION OF WIND DIRECTION. I. *(Fuko hendo no sokutei. I). Text in Japanese. Preprint, Japan Meteorological Society, Tokyo, p. 24, 1975. (Presented at the Japan Meteorological Society, Spring Meeting, Tokyo, Japan, May 21-23, 1975.)*

Wind velocity and direction measurements were taken to investigate factors affecting the diffusion of smoke in a lateral direction. At the top of a building about 12 m high, an ordinary wind velocity meter and a two-demensional ultrasonic wind direction and wind velocity meter were installed at a distance of 2 m and on the same level. The record of the ultrasonic meter was taken at a time interval of 0.5 sec and was treated digitally. Each measurement was made for 50 min. The results of the measurements by these two different meters indicated that the response of the ordinary wind velocity meter changed with the change in wind velocity. Therefore, the ratio of the wind velocity variations obtained with these two meters varied with the wind velocity. The variation width of the wind direction generally increased with an increase in the time of observation. The relationship between the width of variation and the time of observation depended on the wind direction spectrum. The wind direction spectrum obeyed a -2/3 order law, irrespective of the stability at higher frequencies. At frequencies lower than about 0.02, the spectrum was divided into two groups; one decreased rapidly, and the other continued to increase. In the former, an optimum time of observation was present.

53049 **APTIC NO. 76885**

Hosokawa, Y., S. Izumi, M. Chinda, S. Hayakari, T. Seki, and H. Sawa

ANALYSIS OF THE POLLUTION MECHANISM OF THE NITROGEN OXIDES AND OXIDANT CONCENTRATIONS. *(Chisso sankabutsu, okishidanto nodo o chushin ni shita osen kiko no kaiseki). Text in Japanese. Aomori-ken Kogai Senta Shobo (Rep. Environ. Pollut. Control Cent. Aomori Prefect.), no. 1:29, Feb. 1975.*

The nitrogen oxides and oxidant levels in Hachinohe city, Aomori Prefecture, are measured and their trends are discussed. On more than 60% of days the NOx level exceeded the NOx standard; however, days with oxidant level exceeding the standard of 6.0 pphm were rare. Both pollution levels remained similar over the past few years. The nitrogen dioxide and nitric oxide levels at the city s municipal building were more than 2.0 pphm with N or NNE winds. The probability of this level by wind directions was 77% with N wind, 82% with NNE wind, and 50% with other wind directions at this location. There was an industrial area in the NNE direction and a business district in the E direction from the municipal building. The NOx determination at 22 locations by the alkali filter method indicated that the fish market area showed high NOx level in winter. This was attributable to the seasonal winter wind that transported NOx from the industrial area to this area. The 3-month average of NOx pollution from October through December was 11 and 78 micrograms/day/100 sq cm at the municipal building and the fish market area respectively. Oxidant levels above 4.0 pphm were often observed with NNE to ENE winds of more than 3 m/sec velocity at the municipal building. The daily pattern of NO, NO2, carbon monoxide, and hydrocarbons was a 2-peak type, while sulfur dioxide, oxidant, atmospheric temperature, and wind velocity were observed as a single peak pattern. The correlation of oxidant level with these pollution variables was inverse except with the wind velocity. Therefore the oxidant pollution was only weakly related to the primary pollutants but it was more strongly related to the meteorological factors.

53050 **APTIC NO. 77586**

Kojima, K., K. Sekigawa, and T. Sekigawa

THE RELATIONSHIP BETWEEN AEROSOL CONCENTRATION AND METEOROLOGICAL FACTORS. *(Earozoru nodo to kishoyoso to no kankei). Text in Japanese. Taiki Denki Kenkyu (Proc. Soc. Atmos. Electr. Jap.), no. 13:112-116, 1975.*

Aerosol concentration as well as meteorological conditions were measured from January to February 1973 at the Tokyo Science University. The average radii of the aerosol droplets decreased with increasing wind velocity. The concentration of large particles was inversely proportional to the square of the wind velocity. The coagulated aerosols showed no apparent relationship with the wind velocity. The concentrations of large particles and coagulated aerosols increased with increasing relative humidity. The visibility increased significantly as the concentration of large particles decreased, but the relationship between the concentration of the coagulated aerosols and visibility was not as significant. The difference between coagulated aerosols and large particles was attributed to the constant size distribution of the latter.

53051 **APTIC NO. 77348**

Liu, Mei-Kao and John H. Seinfeld

ON THE VALIDITY OF GRID AND TRAJECTORY MODELS OF URBAN AIR POLLUTION. *Atmos. Environ., 9(6/7):555-574, June/July 1975. 15 refs.*

The validity of grid and trajectory models of urban air pollution was evaluated and the magnitude of errors in the solution of the diffusion equation was determined. Grid models imply a coordinate system fixed with respect to the ground, whereas trajactory models have a coordinate system centered on a fictitious vertical air column which moves horizontally with the advective wind. Both models are based on the atmospheric diffusion equation as the essential description of turbulent advection and diffusion. The primary errors committed in the grid model are those attributed to finite difference approximations, whereas the errors in the trajectory model are mainly a result of the assumptions inherent in the model formulation, such as neglect of horizontal turbulent diffusion across the parcel boundaries and neglect of wing shear. Quantitative conditions based on comparison of exact solutions of the atmospheric diffusion equation with those of the grid and trajectory models are derived to indicate when these two classes of models may be accurately employed for various regimes of stability, wind shear, and source configuration.

53052 **APTIC NO. 76792**

Moriguchi, M.

CALCULATION METHOD OF SOX AGGREGATE VOLUME CONTROL. *(SOx soryo kisei no santei hoho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(5):749-767, May 1975. 19 refs.*

A method of calculating total pollution concentrations is described. Smoke sources data must be collected by season, by heating and nonheating periods, and by day and by night. Data on other sources, such as ships, which are not controlled by law must also be collected. Models of meteorological data must be prepared, as well as diffusion models. When the simulation results are compared with actual pollution concentration figures, judgment is based on three factors: the regression coefficient (within the range 0.8-1.2), the correlation (over 0.71 at least, if possible over 0.8), and the concentration pattern. A forecast must be made of future smoke sources, meteorological conditions, and pollution concentration. Since it is unfeasible to require smaller enterprises to install desulfurization equipment, the major part of pollution control becomes the responsibility of big enterprises.

53053 **APTIC NO. 77589**

Ootaki, A., K. Shiozawa, and S. Okamoto

STATISTICAL PREDICTION OF AIR POLLUTANT CONCENTRATION (III). *(Taiki osenshitsu nodo no tokeiteki yosoku hoshiki ni kansuru kekyu (III)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(3):567, 1975.*

The prediction system for regional air pollution is discussed. The method provides the statistical simultaneous forecast in time-spatial axes by employing an estimation theory. The validity of the given system was examined by making a simulated prediction of sulfur dioxide concentration 1 hour ahead of time at 14 monitoring stations in the Chiba Prefecture. The correlation coefficient between the calculated concentration and the observed values in each station is almost 1. This system may be available for 24-hr prediction of air pollutant concentration if sufficient meteorological data is available.

53054 **APTIC NO. 77597**

Ootaki, A., K. Shiozawa, and S. Okamoto

STATISTICAL PREDICTION OF AIR POLLUTANT CONCENTRATION (II). *(Taiki osenshitsu nodo no tokeiteki yosoku hoshiki ni kansuru kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(3):556, 1975.*

The statistical model of the variation of air pollutant concentration should be a mixture of the synthetic type of periodic variation and the auto-regressive type. The statistical estimation theory of air pollutant concentration that conforms to the model of variation of air pollutant concentration is presented. An asymptotic test of the hypothesis and a parameter estimation of the linear regressive model containing an auto-correlated error term in the frequency domain were carried out. The regression model is applied to the estimation of sulfur dioxide concentration 24 hr ahead of time, taking into account the meteorological conditions.

53055 **APTIC NO. 76758**

Penzhorn, Ralph-Dieter, Hans Guesten, Ulrich Schurath, and Karl Heinz Becker

HALOGENATED HYDROCARBONS IN THE ATMOSPHERE· VELOCITY CONSTANTS FOR QUENCHING METASTABLE OXYGEN MOLECULES.

(Halogenierte Kohlenwasserstoffe in der Atmosphaere: Geschwindigkeitskonstanten fuer die Loeschung von metastabilen Sauerstoffmolekuelen). Text in German. Staub, Reinhaltung Luft, 35(3):95-98, 1975. 14 refs.

The quenching of metastable oxygen molecules by freons and other halocarbons was measured in the big sphere at Bonn. The sphere is a 220 cu m stainless steel reactor built for the investigation of gas phase reactions. The reactivity of these compounds, which decreases with increasing substitution of hydrogen atoms by halogen atoms, is always lower than the quenching efficiency of atmospheric oxygen. The results are discussed with consideration of a possible detrimental influence of man-made halocarbons, particularly freons, on the stratospheric ozone balance.

53056 **APTIC NO. 77384**

Ridley, B. A., H. I. Schiff, A. Shaw, and L. R. Megill

IN SITU MEASUREMENTS OF STRATOSPHERIC NITRIC OXIDE USING A BALLOON-BORNE CHEMILUMINESCENT INSTRUMENT.

J. Geophys. Res., 80(15):1925-1929, May 20, 1975. 15 refs.

In situ nitric oxide mixing ratio measurements were made under high sunlight conditions in the stratosphere over New Mexico (17-30.5 km) using balloon-borne chemiluminescent instrumentation. An increase in mixing ratio with height was observed, with NO mixing ratios ranging from 0.15 ppm at 21.28 km to 3.0 ppm at 30.54 km. No serious sampling errors were encountered either from contamination of the sampled air or from removal of NO in the inlet of the instrument. The results from the flights were consistent with earlier chemiluminescent measurements in the 18- to 23 kilometer region. Some discrepancy was noted between the present measurements and previous measurements taken with infrared spectrometry.

53057 **APTIC NO. 76801**

Sakagami, Jiro and Nagayuki Yokoyama

AIR POLLUTION FORECASTING CONTROL SYSTEM.

(Taiki osen yosoku seigyo sisutemu). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(6):497, June 1975.

The text of a panel discussion on air pollution forecasting systems is presented. The air pollution monitoring system in the Kashima Industrial Area was established at a cost of $2,170,000. There are 29 environmental monitoring stations and 40 emission monitoring stations, which are all connected to the same on-line system. The sulfur oxides emission data and areal meteorological data collected in past years and were reported every 10 min, from which values the 3-hour SOx forecasting was projected. The calculation of the forecasting was not, therefore, based on statistically collected data, but was instead based on physical diffusion calculations using the real time data. The accuracy of the 3-hour forecasting for SOx was 70 to 80% according to the experimental results. Forecasting of nitrogen oxides pollution is also planned, however its accuracy would suffer because of the large contribution of mobile sources to NOx pollution.

53058 **APTIC NO. 77350**

Sheih, C. M. and W. J. Moroz

MATHEMATICAL MODELLING OF LAKE BREEZE.

Atmos. Environ., 9(6/7):575-586, June/July 1975. 25 refs.

A two dimensional lake breeze model covering both sides of the lake and allowing for simultaneous imposition of synoptic pressure gradients was developed. The model uses Estoque s techniques for the sea breeze and is essentially the extension of Moroz s lake breeze model with modifications in the treatment of the continuity equation, eddy diffusivity, boundary conditions and the numerical scheme. The model is applied to the cross section of Lake Ontario at Toronto with the prevailing wind from the northwest and perpendicular to the shore. The ground temperature record at Guelph, which is sufficiently far from the lake to be free from lake breeze effect, is used to compute the temperature input to the model. The contours of wind velocities and potential temperature at 1, 9, and 17 hr of the model time and the variation of lake frontal distance from the shoreline are presented. Only one circulation tube with axis parallel to the shoreline is developed over the Northwestern half of the lake extending a horizontal dimension of 8 km inland and 12 km offshore from the shoreline and a depth of 700 m at midday. The maximum onshore flow velocity in the tube is 5 m/sec. This maximum occurs 4 km inland from the shoreline and 300 m above the ground. (Author abstract)

53059 **APTIC NO. 77404**

Smith, F. B. and G. H. Jeffrey

AIRBORNE TRANSPORT OF SULPHUR DIOXIDE FROM THE U.K.

Atmos. Environ., 9(6/7):643-649, June/July 1975. 5 refs.

Sulfur dioxide and sulfate were sampled from aircraft flying along specified tracks off the east coast of England in relatively simple westerly meteorological conditions. The implied fluxes are related to estimated emissions of SO2 into the air as it passed earlier over the source regions of Britain. Typically about 30% is lost by dry deposition to the surface before reaching the tracks, corresponding to a velocity of deposition about 0.8 cm/sec. A further 50-60% typically leaves the country as SO2 in dry conditions and the remainder as sulfate. The fraction converted to sulfate depends quite sensitively on relative humidity. In rainy situations not only is this fraction quite high but the subsequent wash out appears to be highly effective. (Author abstract modified)

53060 **APTIC NO. 77378**

Stephens, Edgar R.

CHEMISTRY AND METEOROLOGY IN AN AIR POLLUTION EPISODE.

J. Air Pollution Control Assoc., 25(5):521-524, May 1975. 10 refs.

Atmospheric chemistry and meteorological factors contributing to a photochemical smog episode in Riverside, California on March 16, 1972 are discussed. The episode was characterized by a sharp vertical boundary between marine air polluted with smog and clean dry air. The clean air just prior to the front s arrival showed an oxidant concentration of 0.04-0.06 ppm; when the smog front passed the air monitoring station, the peak oxidant value was 0.43 ppm. Oxidant values dropped to zero at night probably because the ozone was scavenged by nitric oxide from automobile exhaust. Peroxyacetyl nitrate quickly appeared when the front passed the monitoring instrument, and its concentration rose to 0.04 ppm. Methane equalled or exceeded the worldwide background concentration of 1.39 ppm during the episode. When O3 and PAN were purged from the atmosphere, methane dropped to a constant background level. The arrival of the smog front was marked by a small but sharp drop in the dry bulb temperature and a simultaneous increase in the wet bulb temperature. The winds during the episode were weak and predominantly from the west. No appreciable change in either wind speed or direction was evident when the purging occurred. Solar radiation during the day showed sharp fluctuations, first upward when the smog front passed and then downward for an average attenuation of about 20%.

53061 **APTIC NO. 77532**

Takeuchi, Ushio

THE PH OF RAIN WATER. *(Amamizu no pH ni tsuite). Text in Japanese. Preprint, Japan Meteorological Society, Tokyo, p. 49, 1975. (Presented at the Japan Society Meteorological Spring Meeting, Tokyo, Japan, May 21-23, 1975.)*

The pH of the rain water collected at the Seikei grammer school in Tokyo was 5.2 in 1967, 4.7 in 1968, 4.5 in 1969, 4.6 in 1970, 4.5 in 1971, 4.9 in 1972, 5.1 in 1973, and 5.3 in 1974. This low pH was due to the presence of sulfuric acid, nitric acid, and hydrochloric acid in the rain. The most important of these was H2SO4. The origin of the H2SO4 was possibly sea water, hydrogen sulfide from the seashore, or sulfur dioxide formed by the combustion of oils and coals. An investigation of the ratio sulfur-34/sulfur-32 in rain water showed that 23, 15, and 62% of the H2SO4 in the water were due to sea water, seashore, H2S and fossil fuels, respectively. In an extreme case, 80% of the H2SO4 originated from fossil fuels. Strongly acidic rain water fell when the air mass came from the south (accompanied by the presence of an inversion layer in the upper sky) and when the amount of rain was small. When the air mass came from the north and west the pH of the rain water was usually high; and the contents of sulfate, sodium chloride and magnesium small. Large industrial areas of Yokohama and Kawasaki are to the south of Tokyo. Although there are some industrial areas to the east of Tokyo, the air mass from the east brings precipitation with a relatively high pH of 5.0. The contents of salts are also small.

53062 **APTIC NO. 77620**

Wigley, T. M. L. and P. R. Slawson

THE EFFECT OF ATMOSPHERIC CONDITIONS ON THE LENGTH OF VISIBLE COOLING TOWER PLUMES. *Atmos. Environ., 9(4):437-445, April 1975. 22 refs.*

The governing equations for the initial phase of cooling tower plume behavior are solved numerically to illustrate the quantitative effects of atmospheric temperature, moisture content, stability, and moisture gradient on visible plume lengths. The atmospheric turbulence dominated phase of plume behavior is discussed. Decreasing relative humidity with height and/or stable conditions in the atmospheric leads to decreased plume lengths. The effects are most pronounced at low temperatures and high atmospheric relative humidities. The influence of the entrainment parameter on visible plume length is examined and is relatively minor when compared to the influences of atmospheric conditions. The numerical results are compared with a simple graphical solution and the results show considerable disparity.

53063 **APTIC NO. 76820**

Yokoyama, Nagayuki

INTRODUCTION OF TOTAL WEIGHT REGULATIONS AND TRENDS IN POLLUTION FORECASTING TECHNIQUES. *(Soryo kisei no donyu to osen yosoku shuho no doko). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(4):323-328, 1975. 10 refs.*

Diffusion models for the determination of total emission standards for sulfur oxides are discussed. In simulation calculations for SOx levels, plume or puff models are used. Simplified diffusion models are applicable only if there is no smoke downwash due to upright projections in the topography, including chimneys and surrounding buildings, the SOx in the atmosphere are stable, SOx on surrounding objects are not adsorbed. The last two conditions are satisfied in most situations. When downwash effects are present, simulations must be based on wind-tunnel experiments. Long-term average concentrations, used in setting environmental standards, are obtained from simplified meteorological diffusion models. Hourly pollutant concentrations are classified according to meteorological conditions, and averaged for the various classes. Equations which result in comparatively high degrees of agreement with actual values are: Briggs (1969); Moses and Carson (1968); CONCAWE (Conservation of Clean Air and Water, Western Europe, 1966). The determination of background SOx concentrations is necessary for increased accuracy in simulation calculations, especially where new industrial areas are to be established.

53064 **APTIC NO. 77493**

Yokoyama, Nagayuki and Shin Yamamoto

ON THE PREDICTION OF NOX DIFFUSION IN THE AIR. *(NOx no taiki kakusan no yosoku ni tsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(6):515, June 1975.*

Simulation techniques for the atmospheric diffusion of nitrogen oxides are considered. Of all the diffision models available (Primitive, Box, Plume, and Puff Models), the Plume or Puff model is the most suitable for NOx simulation. Based on the NOx data and the automobile traffic data in the (Kashima Industrial Area, the atmospheric NOx level was calculated by the Plume Model which was modified to include the contribution of automobile NOx emission on the areal major roads. The reaction order and reaction rate for the oxidation of nitric oxide to nitrogen dioxide were 0.8 to 1 and 0.001 to 0.0005 respectively. The 5-class atmospheric stability proposed by Yokoyama was used for the simulation. The trend for the calculated 1-hour average for NO2 agreed with that for the observed value, however the observed background NO2 level was still 6 to 7 ppm when the calculated level was zero. The agreement between two 1-hour values for NO was very poor. When the seasonal or yearly average NO2 was calculated, the agreement with the observed value was even better, with the exception of the winter average of NO2. The present model neglects the diffusion of NOx originating from all places except major roads and major stationary emission sources. The diffusion of NOx during the presence of atmospheric inversion layers at ground level (which often occurs during winter and night time) is also neglected.

53065 **APTIC NO. 77513**

Yoshida, T.

EFFECTS OF SURFACE ROUGHNESS ON SMOKE DISPERSION IN A WIND TUNNEL TEST. *(Fudo Jikken ni yoru chihyo sodo no kemuri no kakusan ni oyobosu eikyo). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rept. Environ. Pollut. Control Cent., Aomori Prefect.), no. 1:87-94, Feb. 1975. 13 refs.*

A wind tunnel experiment was conducted to study the effect of surface roughness on smoke dispersion at neutral atmospheric stability. A 12.5 cm fence was placed in a 107 cm by 214 cm by 10 m wind tunnel at 5 m from the entrance, and 5 by 5 by 5 cm blocks were placed behind the fence for a total length of 75 cm. The 5 cm roughness was followed by 425 cm and 500 cm of 2 cm roughness with a 120 cm gap between the two. The temperature in the tunnel was kept at 30 C and the boundary layer thickness, turbulence intensity, Reynolds stress, and turbulence diffusion coefficient were determined. The boundary thickness was about 15 cm and the turbulence intensity about 3%, without the roughness. The boundary layer thickness increased to about 30 cm while the turbulence intensity increased to 10% with the roughness. The Reynolds stress showed approximately the same value as the boundary layer thickness with the formation of a constant flux layer. The turbulence diffusion coefficient increased with increasing wind velocity and boundary layer thickness.

53066 ***APTIC NO. 77548***

Zannetti, P. di and E. Runca

VALIDITY OF THE APPLICATION OF A GAUSSIAN CLIMATOLOGICAL MODEL IN THE VENICE AREA. (Validita della applicazione di un modello gaussiano di tipo climatologico nell area Veneziana). Text in Italian. Inquinamento, 17(5):9-13, May 1975. 22 refs.

The validity of the application of a Gaussian diffusion model to describe the dispersion of atmospheric pollutants in a complex coastal zone such as the Venetian area was investigated. The model is based on the assumption that the pollutant has a Gaussian distribution along the vertical and is uniformly distributed crosswind in each sector of the wind rose. Since data about the emissions of the area sources were unknown, the model is applied only to simulate the concentration field due to the sulfur dioxide emissions of the industrial point sources. Using meteorological data recorded on an hourly basis and SO2 emission data, monthly average concentrations are computed for the non-heating season in order to assume the contribution of commercial and domestic sources as negligible. The results are compared with the concentration values recorded at ten stations of the ISS-ENI-Tecneco network during the period May-Sept. 1973. A correlation coefficient equal to 0.847 is obtained. The model is valid for stimulating long term average concentrations in the Venetian area.

53067 **APTIC NO. 76888**

Pollution Control Office, Kanagawa Prefecture (Japan)

AIR POLLUTION AND WEATHER CONDITION: ON THE RELATION BETWEEN HIGH OXIDANT CONCENTRATION POLLUTION AND WEATHER CONDITION IN KANAGAWA PREFECTURE. *(Taiki osen to kisho: Kanagawa-ken ni okeru okishidanto konodo osen to kisho no kankei). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 17:68-79, Feb. 1975.*

In 1973, photochemical smog pollution warnings were issued 30 times in Kanagawa compared to 31 in 1972 and 11 in 1971. The date, time, area involved, and oxidant concentration are compiled and analyzed. The average oxidant concentration at the time of the issuance of warning was in the range of 0.12-0.30 ppm. The regional analysis indicates marked increases in frequency of warning issued in Hiratsuka city (four in 1972 and 13 in 1973) and Chigasaki (one in 1972 and 12 in 1973). The data of meteorological conditions on days when warnings were issued were compiled and analyzed. The meteorological characteristics associated with high oxidant concentration were cloudy weather, maximum temperature above 25 C, visibility less than 10 km at 9 am, and 3 pm, and atmospheric stability most frequently at 1000-3000 m MMD. The relationship between the local wind pattern of the Kanto area and high oxidant concentration is also analyzed. Analysis examples of meteorological conditions on high oxidant concentration days are given.

1974

53068 **APTIC NO. 76870**

Chisaka, F., S. Yanagihara, and Isamu Shimada

ANALYSIS OF PHOTOCHEMICAL SMOG BY MATHEMATICAL TREATMENT, (2)- ASSUMPTION OF OZONE CONCENTRATION IN MOVING ATMOSPHERE. *(Kokagaku smoggu no suchikeisan ni yoru kaiseki, (2) - Idotaikichu no ozon nodo no suitei -). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 41-44, 1974. 3 refs. (Presented at the Japan Society of Mechanical Engineers, Hokkaido Branch Lecture Meeting, 17th, Hokkaido, Japan, 1974.)*

A mathematical method of estimating ozone concentration using such parameters as duration of daylight, dilution in the atmosphere, and discharge of first-order pollution compounds in broad-field pollution phenomena was developed. The original reaction compounds were propylene and nitrogen oxides. The relationship between duration of daylight and nitrogen oxide hydrocarbon reactions, the relationship between duration of daylight and optimum ozone concentration, and the effect of dilution and discharge rate of propylene and NOx on ozone concentration, and the effect of dilution and discharge rate of propylene and NOx on ozone concentration. The NOx and C3H6 concentrations were greater than the background concentrations reported in the world (NOx, less than 0.2 ppm, C3H6, less than 0.1 ppm). With an increase in the HC/NOx ratio, the time required to reach the nitrogen dioxide peak also increased.

53069 **APTIC NO. 77543**

Gajendragadkar, S. K.

ROLE OF DIFFUSION MODELS IN AIR POLLUTION. *J. Inst. Engrs. (India) (Calcutta), 55(Part PH 1):1-4, Oct. 1974.*

The role of diffusion models in air pollution is discussed. Diffusion simulation modeling is a procedure for assessing the impact of alternative control strategies upon a given community. The model consists of a set of relationships which simulate environmental factors, such as air flow and mixing, and the subsequent fate of air pollutants released into this environment. Concentrations may be calculated for a given receptor in the area, or for a number of pollutants, depending upon information available and adjustment of certain parameters. Modeling approaches require information on the emission rates of sources, and their heights and locations.

53070 **APTIC NO. 76850**

Kroch, Eugene

TASSIM: AN APPLICATION TO LOS ANGELES (SUPPLEMENTARY REPORT). *Harvard Univ., Cambridge, Mass., Dept. of Transportation Contract DOT-OS-30099, Rept. DOT-OS-30099-7, 57p., Nov. 1974. 17 refs.*

NTIS: PB 238270

The Transportation and Air Shed Simulation Model (TASSIM) which provides a framework for analyzing intra-metropolitan air quality effects of policies that alter the level or spatial distribution of transportation activity and affect patterns of land use is described. The model integrates an urban transportation planning model, vehicle emission factors, and simple air diffusion models within a simulation framework. The model is spatially disaggregated, including between 100 and 200 zones, and is compatible with data sources available in many metropolitan areas. The model is applied to the Los Angeles area after certain modifications, and its performance in this region is compared with previous experience for the Boston area.

53071 **APTIC NO. 77486**

Kuronuma, H., H. Higashihara, and S. Horie

A THREE-DIMENSIONAL TURBULENCE DIFFUSION MODEL FOR ESTIMATING AIR POLLUTION BY EXHAUST. *(Jidosha haiki gasu ni yoru taiki osen suitei no tameno sanjigen ranryu kakusan moderu ni tsuite). No. 1. Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, vol. 4:270-271, 1974. 2 refs. (Presented at the Japan Society of Civil Engineers, Lecture Meeting, 29th, Tokyo, Japan, 1974.)*

A model of air pollution is described, as well as a forecast model. The model consists of two parts: traffic conditions, aerial and topographical conditions, road conditions, and the calculation of emission concentrations, atmospheric flow and the distribution of concentration by diffusion. Results obtained from the model were very close to actual figures.

53072 **APTIC NO. 77514**

Sato, K. and J. Takeuchi

DIFFUSION OF AEROSOL PARTICLES IN THE ATMOSPHERIC BOUNDARY LAYER. (PART II). *(Taiki* *kyokaiso ni okeru earozoru ryushi no kakusan. (Dai 2 ho)). Text in Japanese. Aichi-ken Kogai Chosa Senta Shobo (Rept. Environ. Pollut. Res. Cent., Aichi Prefect.), no. 2:7-10, 1974. 6 refs.*

The variation of the particle size distribution in the atmospheric boundary layer was studied by the diffusion of particles released from an area source. The diffusion model used in the study was based on the assumptions that all particles were spherical, that no aggregation, segregation, gas-release or gas-absorption of the particles occurred, and that the distribution condition of the particles on the source did not change with respect to unit area. The radii of the particles were 1-10 microns, which corresponded to a flow velocity of 0.024-2.404 cm/sec with a particle density of 0.2 g/cu m. The height of the area source was fixed at 54 m and the first order diffusion equation was solved by Shimanuki s matrix method. Results showed that, in the Ekman layer, the concentration of particles larger than 4-5 microns decreased and the mean particle size became smaller with increasing height.

53073 **APTIC NO. 77614**

Suzuki, Shin

ATMOSPHERIC CHEMICAL REACTION. PART 1. GLOBAL FORMATION AND EXTINCTION OF ATMOSPHERIC COMPONENTS. *(Taiki kagaku hanno. Dai-1kai. Gurobaru na kanten kara mita taiki seibun no seisei to shonetsu). Text in Japanese. Sekiyu Gakkaishi (J. Japan Petroleum Inst. (Tokyo)), 17(12):1053-1062, Dec. 1974. 50 refs.*

The formation and extinction processes of atmospheric components is reviewed. Various pollutants are continuously emitted into the atmosphere and these pollutants become extinct with or without undergoing various changes. The formation and extinction mechanisms, environmental cycle, and mass rate balance of sulfur compounds (sulfur dioxide, hydrogen sulfide), nitrogen compounds (ammonia, nitrous oxide, nitric oxide, nitrogen dioxide), carbon dioxide, carbon monoxide, hydrocarbons (total HC, methane), and aerosols (liquid or solid and organic or inorganic particulates in the particle size range of 0.01-1000 micron) are reviewed.

53074 **APTIC NO. 76867**

Electric Power Research Inst. (Japan), Technical Lab. No. 1

CONSTRUCTION OF STACK GAS DISPERSION SIMULATION TAKING THE INFLUENCES OF SMOKE EMISSION SCALES INTO CONSIDERATION. *(Engen kibobetsu no eikyodo o koryo shita haien kakusan shimureshon no kosei). Text in Japanese. Denken-ho (Rep. Inst. Electr.), no. 32:6-11, Aug. 1974.*

A flue gas diffusion simulation method was proposed. The simulation uses hourly meteorological and emission data for a given location as input, and the emission diffusion is classified into 5 different patterns corresponding to the weather conditions and emission scales. The ground concentration distribution is then estimated by a step-by-step correction by comparing the calculated results with the experimental results. The simulation model is constructed from a long-term average ground concentration so that the hourly and daily average concentrations can be estimated by on-line input of meteorological and emission data. The simulation method was applied to an area having about 20 major factories with 32 sources each emitting more than 0.0015 N cu m/sec of sulfur oxides. An overall average concentration of 0.54 mg sulfur trioxide/day/100 sq cm was obtained with high accuracy.

1973

53075 **APTIC NO. 77573**

Sugawara, M. and H. Nishida

A STUDY ON THE RELATIONSHIP BETWEEN TRAFFIC POLICY AND AIR POLLUTION. *(Kotsu seisaku to taiki osen no kanren ni tsuite no kenkyu). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 175-176, vol. 4, 1973. (Presented at the Japan Society of Civil Engineers, Lecture Meeting, 28th, Tokyo, Japan, 1973.)*

An attempt was made to select criteria for evaluating city traffic regulations, taking diffusion into account, including pollution from exhaust gases, is described. Kumamoto City was chosen, and evaluation was set up for 1975 and 1985. Traffic congestion, exhaust pollution, and the balance sheet of the public transportation system were considered in setting up model. By the convergence method, the traffic volume distribution was calculated, as well as access time during peak periods. Carbon monoxide was the only exhaust gas considered. Kumamoto City was divided into grids of 1 sq km and the number of vehicles per sq km, the road width, the speeds of vehicles, were calculated to obtain the hourly CO emission value. The annual average wind velocity, wind direction, and regional diffusion coefficient were used to formulate a diffusion model. The results envisaged for 1985, when countermeasures will have been taken on three points are presented.

53076 **APTIC NO. 77363**

Bureau of Public Health and Environmental Pollution, Himeji (Japan), Himeji Municipal Office and Himeji Medical Assoc.

RESUME OF THE REPORT. *(Sokatsu). Text in Japanese. In: Report of Survey on the Influence of Air Pollution on Health, p. 118-119, 1973.*

Although sulfur oxides, settling dusts and floating dusts decrease yearly in Himeji City, and are now far lower than the old limits except in certain areas where smoke stacks are higher. The concentrations of nitrogen oxides exceeded the limit in all monitoring areas without any countermeasures. The occurrence of photochemical smog was more frequent than that in 1972. However, no injuries occurred. In two areas the occurrence of respiratory diseases such as frequent cough, sputum, and asthma were more frequent than in other areas. In general, these diseases decreased yearly.

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53077 **APTIC NO. 77618**

Besserer, George J. and Donald B. Robinson

EQUILIBRIUM-PHASE PROPERTIES OF NITROGEN-HYDROGEN SULFIDE SYSTEM. *J. Chem. Eng. Data, 20(2):157-161, April 1975. 9 refs.*

Vapor and liquid equilibrium-phase compositions and refractive indices were determined for the nitrogen-hydrogen sulfide system at 1.9 F, 40.1 F, 80.4 F, 119.7 F, and 160 F from the vapor pressure of hydrogen sulfide to a pressure of 3000 psia. The equilibrium ratios were calculated for each component at each temperature from the phase composition data. The equilibrium-phase densities were calculated from the measured phase composition and refractive index by use of the Lorentz-Lorenz molar refractivity relationship. (Author abstract)

53078 **APTIC NO. 77616**

Campbell, I. M., B. J. Handy, and R. M. Kirby

GAS PHASE CHAIN REACTION OF H2O2+NO2+CO. *J. Chem. Soc., 71(4):867-874, 1975. 16 refs.*

The reactions occurring in hydrogen peroxide + nitrogen dioxide + carbon monoxide mixtures at ambient temperatures are a chain sequence with hydroxyl (OH) radicals as the chain carrier. This system can be used as a non-photolytic source of rate constant data for reactions of OH with added substrates relative to that of OH + CO. This potential was demonstrated with n-butane. The result obtained was in good agreement with the literature. This method overcomes many of the preclusions as to the nature of the substrate which limit the scope of photolytic sources of OH. (Author abstract)

53079 **APTIC NO. 77491**

Doerre, W. H. and M. A. Pinigin

ON FIXING HYGIENIC NORMATIVE VALUES FOR HARMFUL SUBSTANCES IN THE ATMOSPHERE.

(Zur Festlegung hygienischer Normative fuer Schadstoffe in der atmosphaerischen Luft). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 21(4):295-297, 1975. 7 refs.

The distribution of the concentration averages for an optional period of time are approximately logarithmic. In most cases, the limits of the actual standard deviations of the logarithmic concentrations can be given. If the parameters of the distribution of the concentration averages are known for a certain time period, the distribution parameters for any other period of time can be determined mathematically. The concentration changes of an optional time unit have approximately normal distribution. Frequency and duration of excesses of certain concentrations as well as values within a given period can be calculated from the distribution parameters of concentration and concentration changes.

53080 **APTIC NO. 76755**

Fox, Donald L., Richard Kamens, and Harvey E. Jeffries

PHOTOCHEMICAL SMOG SYSTEMS: EFFECT OF DILUTION ON OZONE FORMATION.

Science, 188(4193):1113-1114, June 13, 1975. 1 ref.

The necessity of considering dilution, hydrocarbon reactivity, and diurnal solar radiation in photochemical smog reactions is demonstrated in an outdoor smog chamber with a hydrocarbon and nitrogen oxide mix simulating urban systems. Reactive systems which normally achieve maximum oxidant values during the early afternoon may initially generate oxidant faster under dilution conditions but probably will not reach the oxidant concentrations generated by static systems. In contrast, less reactive systems under certain dilution conditions may actually generate more oxidant. An oxidant (ozone) concentration of the diluted side actually exceeded the federal air quality standard (0.08 ppm), although that of the undiluted side did not. Greater control of the hydrocarbon content as compared to the NOx content tends to shift the urban atmosphere in the direction of one containing less reactive mixtures.

53081 **APTIC NO. 77395**

Freiberg, Johnny

THE MECHANISM OF IRON CATALYZED OXIDATION OF SO2 IN OXYGENATED SOLUTIONS.

Atmos. Environ., 9(6/7):661-672, June/July 1975. 17 refs.

A new theory for the iron catalyzed oxidation of sulfur dioxide is described. The proposed mechanism allows for the simultaneous oxidation of sulfur dioxide by oxygen in the presence of iron+3 ion as a catalyst, and by Fe+3 ion in the presence of O2. The oxidation by Fe+3 ion changes from a zero order to a first order dependence on concentration of Fe+3 ion with decreasing Fe+3 ion concentration. It competes with catalytic oxidation by O2 at Fe+3 ion concentration greater than 0.002 mole/l. The overall reaction rate changes from a concentration of SO2+2 ion/hydrogen ion concentration cubed dependence to a concentration SO2/H ion dependence with increasing pH and/or increasing concentration of SO2. When Fe+2 ion and Fe+3 ion are both present initially, the mechanism predicts the simultaneous oxidation of Fe+2 ion and SO2. The new rate expression can be used in reaction rate studies of sulfate formation in urban atmospheres such as Freiberg s work that investigates the effects of relative humidity and temperature on catalytic SO2 oxidation in atmospheric aerosols. (Author conclusions modified)

53082 **APTIC NO. 76869**

Fujimura, M. and Y. Hashimoto

ANALYSIS OF SIZE DISTRIBUTION DATA OF PARTICULATE MATTERS BY ANDERSEN SAMPLER.

(Andasen sanpura ni yoru earozoru no ryudo bunpu no kaiseki). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 24(1):36, Jan. 1975.

A treatment method for aerosol particle size data collected by Andersen samplers is proposed, in which the cumulative weight distribution of particles by each filtering stage is plotted linearly against the logarithmic particle sizes. By differentiating this cumulative distribution curve, the frequency distribution curve is made. The aerodynamic mass medium diameter can be obtained from the former curve and the peak particle size can be determined directly from the latter curve. The proposed method was applied to treat air sample data collected for the Yokohama city area by the 8 stage Andersen sampler. The AMMD was obtained as 0.9 micron from the cumulative distribution curve, and the peak particle size was around 4 micron from the frequency distribution curve. For the same data, iron and zinc concentrations in the particles were plotted separately by the proposed method. The iron peak size was around 4 micron and the zinc peak occurred at 0.9 micron. The cumulative distribution curve was not linear, indicating that the approximation by logarithmic normal distribution was not current. When these data were plotted in the histograms, the peak size of iron or zinc could not be determined. The proposed method can treat the data as a continuous function, and with this method it was not necessary to treat the data with the logarithmic normal distribution.

53083 **APTIC NO. 77606**

Glavas, Sotirios and Sidney Toby

REACTION BETWEEN OZONE AND HYDROGEN SULFIDE.

J. Phys. Chem., 79(8):779-782, April 10, 1975. 13 refs.

The reaction between ozone (O3) and hydrogen sulfide (H2S) was studied from 25 to 70 deg over a pressure range of 0.005-0.1 torr of O3 and 0.2-5 torr of H2S. Oxygen (O2) is the most important product of the reaction. The (O2 formed)/(O3 used) ratio approached 1.5. The water (H2O)/sulfur dioxide (SO2) ratio varied considerably from unity. The SO2, H2O, and H2S in the products were determined and good hydrogen, oxygen, and sulfur mass balances were obtained. Runs carried out in the presence of added O2 or carbon dioxide showed no change in rate, measured as -d(O3)/dt. The rate law found was zero order in H2S and (1.75 + or - 0.25) order in O3. A free-radical mechanism is proposed which accounts for the observed kinetics and which gives qualitative agreement with the observed product ratios. (Author abstract)

53084 **APTIC NO. 77497**

Jayanty, R. K. M., R. Simonaitis, and Julian Heicklen

THE PHOTOLYSIS OF CCL4 IN THE PRESENCE OF O2 OR O3 AT 213.9 NM, AND THE REACTION OF O(1D) WITH CCL4.

J. Photochem., 4(3): 203-213, July 1975. 22 refs.

The photolysis of carbon tetrachloride in the presence of oxygen or ozone and the reaction of O(1D) with CCl4 are calculated. When CCl4 is photolyzed at 25 C with 213.9 nm radiation in either the presence of O2 or O3 the products are CCl2O, chlorine, and an unidentified compound. The results are interpreted in terms of an excited molecule mechanism which proceeds entirely by CCl4 yields CCl2 and Cl2 at low pressures, with singlet CCl2 being produced. At higher pressures CCl4 is quenched and CCl2 production is inhibited, though it may be replaced by production of CCl3 and Cl. The O(1D) reaction with CCl4 at 25 C gives CCl2O and Cl2 as the exclusive products. The O(1D) was produced from O3 photolysis at 253.7 nm. The O3 consumption is the same, or slightly higher than in the absence of CCl4. (Author summary modified)

53085 **APTIC NO. 77380**

Kitamoto, Asashi and Yoichi Takashima

ANALYSIS ON AEROSOL DEPOSITON FROM TURBULENT FLOW TO VERTICAL SURFACES. *Bull. Tokyo Inst. Technol., no. 127:91-104, 1975. 8 refs.*

A mathematical analysis of the deposition of monodisperse particles in a turbulent flow onto a perfect sink wall in a vertical pipe is given which is applicable to particle diameters less than about 50 micron, assuming the dimensionless relaxation time of the particle is less than about 10-20. The dimensionless radius of the particle is the most important factor used to evaluate the particle deposition velocity. Other important factors are the Reynolds number, the dimensionless relaxation time, and the fluid-particle interaction factor. Brownian diffusion becomes significant for submicron particles. The particle deposition velocity is shown to be equal to the transfer coefficient of molecular substances for high Schmidt numbers. (Author abstract modified)

53086 **APTIC NO. 77382**

Lin, M. J. and J. H. Lunsford

PHOTOOXIDATION OF SULFUR DIOXIDE ON THE SURFACE OF MAGNESIUM OXIDE. *J. Phys. Chem., 79(9):892-897, April 24, 1975. 19 refs.*

The photooxidation of sulfur dioxide on the surface of magnesium oxide in the presence of adsorbed water vapor and oxygen or nitrous oxide is studied in relation to the chemistry of atmospheric aerosols. Water reacts with adsorbed SO2 to increase the concentration of sulfite ions and monodentate sulfito complexes. Subsequent photolysis leads to the formation of sulfite ion. Molecular oxygen or N2O serve as electron scavengers, thus increasing the surface concentration of sulfite. The greater stability of sulfite ion on surface s relative to aqueous solutions is attributed to the lack of mobility in the adsorbed water. The half-life of the surface sulfite is greater than 10 hr at 25 C but drops off to 0.5 min at 100 C. (Author abstract modified)

53087 **APTIC NO. 77347**

Nguyen, Yen V. and Colin R. Phillips

THE EFFECT OF ANILINE ON PHOTOCHEMICAL REACTIONS IN ATMOSPHERIC AND SYNTHETIC AIR SAMPLES. *Chemosphere, 4(3):125-130, June 1975. 14 refs.*

The inhibitory effect of aniline in photochemical smog reactions was studied using actual Toronto air samples. An aniline concentration of 0.81 pphm has negligible effect in a light traffic air sample containing negligible nitric oxide, whereas 20 pphm in a heavy traffic sample causes a 70% decrease in the oxidant dosage, a 50% decrease in the nitrogen dioxide peak, and a four-fold increase in the nitric oxide half life. In experiments with propylene in synthetic mixtures, the half-life of propylene is increased from 144 min to 192 min by the presence of 20 pphm of aniline. In addition, a thirty fold increase in condensation nuclei is produced following a 1 hr induction period. A chemical mechanism is proposed which is consistent with these results. Although the condensation nuclei detected may be too small to produce light scattering, they may be retained in the lung. In addition, they may grow in size. These consequences do not favor the use of aniline as an inhibitor in photochemical smog. (Author abstract modified)

53088 **APTIC NO. 77607**

Robinson, Donald B., Gerald P. Hamaliuk, Thamra R. Krishnan, and P. Raj Bishnoi

COMPRESSIBILITY FACTORS OF NITROGEN-HYDROGEN SULFIDE MIXTURES. *J. Chem. Eng. Data, 20(2):153-157, April 1975. 6 refs.*

Experimental compressibility factors were determined for two gas mixtures, one containing 8.6 mol% hydrogen sulfide and 91.4 mol% nitrogen and the other containing 22.2 mol% hydrogen sulfide, 76.5 mol% nitrogen, and 1.3 mol% carbon dioxide. Measurements were made at 20 C, 40 C, 60 C, 80 C, and 100 C at pressures to about 4500 psia. Second virial coefficients were calculated for both mixtures at each temperature. The experimental compressibility factors were compared with those calculated with the Benedict-Webb-Rubin equation of state. The root-mean-square difference was 0.81% for the 8.6 mol% mixture and 0.62% for the 22.2 mol% mixture. (Author abstract)

53089 **APTIC NO. 76884**

Suzuki, Shin and Nobutoshi Horiuchi

PHOTOCHEMICAL REACTIONS OF SULFUR DIOXIDE GAS AND ACETALDEHYDE. *(Aryusan gasu aseto arudehido no kokagaku hanno). Text in Japanese. Chiba Daigaku Kankyo Kagaku Kenkyu Hokoku (Environ. Sci. Res. Rep., Chiba Univ.), no. 2:81, March 1975.*

The photochemical reaction between acetaldehyde and oxygen with and without sulfur dioxide presence was studied. To a reduced pressured Pyrex reaction cell containing 20% oxygen, acetaldehyde and/or SO2 were added and the cell pressure was adjusted to the atmospheric pressure with nitrogen gas. The reaction cell was irradiated by a high pressure mercury lamp for up to 3 hr, and the reaction products were analyzed by gas chromatography. Methane, ethane, acetone, acetic acid, carbon monoxide, and carbon dioxide were identified from the reaction between acetaldehyde and oxygen; however no formaldehyde or water were detected. The compounds produced in the system with the presence of SO2 were same as those without SO2. However, the consumption of acetaldehyde during the reaction was larger when SO2 was added to the reaction system. The acetaldehyde concentration of 0.1 mole/l in the initial reaction cell decreased to 0.07 mole/l and 0.02 mole/l for the systems with and without 10% SO2 presence after 3 hr irradiation, respectively. The production of methane, ethane, acetone, acetic acid, and carbon monoxide was slower with the increased SO2 concentration in the initial system. For example, the amount of methane produced in the system of 20% O2 and 20% acetaldehyde after 3 hr irradiation was 1 mmole/l and 0.8 mmole/l when the system contained 10% and 20% SO2 respectively. During the reaction with the presence of SO2, a white solid and black-brown liquid were produced. The former product was assumed to be sulfur trioxide. The infrared absorption spectra of the latter product indicated the presence of carbonyl groups and methyl groups, however, the product could not be identified.

53090 **APTIC NO. 77381**

Takayasu, Masami, Kyoichi Kanzaki, Yoshiaki Annen, Katsumi Takano, and Yoshiro Morita

EFFECTS OF O2 AND CO ON THE REDUCTION OF NO WITH NH3 OVER CU-ALUMINA CATALYST. *(Do-arumina shokubaijo no NO no ammonia kangen ni taisuru O2 to CO no eikyo). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan (Tokyo), 54(2):95-101, 1975. 6 refs.*

The catalytic reduction of nitric oxide with ammonia over a copper-alumina catalyst was studied along with the effects of oxygen and carbon monoxide on the reaction. The surface reaction of NO with NH3 appeared to proceed via a reaction that gave molecular nitrogen and water. The conversion of NO decreased and the oxidation of NO became significant with increasing temperature when 10 vol% O2 was present in a system containing 500 ppm NO, 650 ppm NH3, and nitrogen. When 2.0 vol% CO was added to a system containing 500 ppm NH3, 500 ppm NO, 10 vol% O2, and N2, CO was easily oxidized above 200 C; the carbon dioxide formed did not show significant influence on the NO-NH3-O2-N2 balance system. Nitric oxide conversion was more depressed and oxidation of NO became more significant when CO was present. The amount of NH3 adsorbed on the catalyst was about 0.0004 mol/g, with the value decreasing to 1/4 of that when 0.3-0.6 vol% of CO was present. The amount of NO adsorbed on the catalyst was about 1/60 that of NH3.

53091 **APTIC NO. 76780**

National Research Lab. of Meteorology (Japan)

STUDIES ON THE STANDARD GAS PREPARATION METHOD BY MASS RATIO MIXING METHOD TO IMPROVE THE RELIABILITY OF THE ENVIRONMENTAL POLLUTION MONITORING EQUIPMENT. *(Kogai keisokuki no shinraisei kojo no tame no shitsuryo kongo ho ni yoru hyojun gasu sakusei ho no kenkyu). Text in Japanese. JITA News, vol. 1975:9, June 1975.*

A mass ratio mixing method for gas preparation is described. A cylinder with an inner volume of 10 l is cleaned with diluting gas and is weighed by degassing to high vacuum (0.00001-0.000001 torr). The cylinder is connected to a gas container through tubing and after the tubing is degassed, sample gas is introduced and the resulting weight is measured. Diluting gas is then added to the cylinder at 100 - 150 torr and the cylinder is weighed. The volume ratio concentration of the standard is obtained by calculation from the above measured weights and the specific volumes of the standard gas and diluting gas. The mass ratio mixing method has the disadvantage of low accuracy (1%).

1974

53092 **APTIC NO. 77449**

Morrison, Frank A., Jr.

DYNAMICS OF AEROSOLS AND HYDROSOLS: CLASS NOTES. *California Univ., Livermore, Calif., Lawrence Livermore Lab., Atomic Energy Commission Contract W-7405-Eng 48, 253p., 1974. 93 refs.*

NTIS: UCID-16575

The term, aerosol, is used to mean a small solid or fluid particle suspended in air. Solid particles in gas or in liquid, liquid particles or drops in gas or in liquid, and gaseous particles or bubbles in liquids are considered. Fluid kinematics and dynamics are considered, including free mean path and Knudsen number, viscosity, stress and strain rate, vorticity and fluid rotation, continuity, acceleration, the Navier-Stokes equations, and Reynolds number. The coordinate systems used, conformal transformations, and Cartesian tensors are described. Axisymmetric flow is considered, including the stream function, azimuthal velocity and swirl, the equation of motion, and some boundary conditions. Stokes Law is developed. The Stokeslet, motion of a bubble or a drop, electrophoresis, continuum-slip flow, thermophoresis, hydrodynamic interactions between particles and between a particle and a surface, and transient motion are considered.

53093 **APTIC NO. 76794**

Oya, M., M. Koshi, M. Aematsu, and T. Asaba

HIGH TEMPERATURE REACTION OF NITROGEN-OXYGEN-ARGON SERIES. *(Chisso-sanso-arugon kei no koon hanno). Text in Japanese. Preprint, Japan Combustion Assoc., Tokyo, 4p., 1974. 3 refs. (Presented at the Japan Combustion Association Symposium, 12th, Tokyo, Japan, Dec. 5-6, 1974.)*

Using a standard type shock tube (inner diameter of 5 cm), nitrogen oxide, diluted in argon was heated to 2500-4000 K. Nitric oxide and atomic oxygen were measured by means of luminescence. The initial concentration of NO was 0.3-6.3 times 10 to the -8 mole/cc. The NO/Ar composition was 2/98-10/90. The experimental results were different than calculations based on the reaction mechanism. A nitrogen-oxygen-argon system was also investigated. The initial concentrations of N2, O2, and Ar were 0.28-1.4 times 10 to the -7 mole/cc, 0.28-1.4 times 10 to the -7 mole/cc, and 1.06-5.54 times 10 to the -6 mole/cc, respectively. From these NO concentration profiles, induction time and generation speed were sought. The decomposition and generation of NO could not be explained by the Zeldovich mechanism alone. Steps being taken to formulate a new hypothesis for the reaction mechanism are outlined.

53094 **APTIC NO. 76891**

Uchiyama, M., Y. Shimada, I. Takahashi, Y. Saito, and F. Hayashi

STUDIES ON THE PHOTOCHEMICAL AIR POLLUTION; PHOTOLYSIS REACTION OF LEAD HALIDE IN THE AUTOMOTIVE EXHAUST GAS. *(Kokagaku taiki osen ni kansuru kosatsu; jidosha haikigasu chu no harogenkaen no hikari bunkai hanno). Text in Japanese. Gunma-ken Kogai Kenkyu Senta Nenpo (Annu. Rep. Gunma Prefect. Res. Center Environ. Sci.), no. 6:136, Nov. 1974.*

The effect of humidity and light intensity on the decompositions of lead bromide and lead chloride is examined. Each of 0.5 g PBCl2 and 0.5 g PbBr2 was placed in a quartz reaction cell which was then irradiated by a xenon lamp. After the irradiation, the decomposition products were absorbed by an absorbing liquid and quantitated in terms of halogen ions. The chloride ion production increased with stronger light intensity, longer irradiation time, and higher humidity. The chloride ion generated for 3 hr irradiation with the light intensity comparable to that of the sunlight in summer and in winter was 2500 mmole and 500 mmole respectively. The chloride ion generated under air containing 16 g water/cu m air and 4 g water/cu m air was 200 mmole and 1200 mmole respectively after 1.5 hr irradiation with the summer equivalent light intensity. The bromide ion generation was 5 times faster than the chloride ion generation under the same irradiation conditions.

1973

53095 **APTIC NO. 76802**

Okuno, T. and M. Tsuji

GAS CHROMATOGRAPHY AND THE MASS SPECTRUM OF CHLOROBIPHENYLS. *(Enka biheniru no GC-MS bunseki). Text in Japanese. Hyogo-ken Kogai kenkyusho Kenkyu Hokoku (Rep. Environ. Sci. Inst. Hyogo Prefect.), no. 5:54-56, Nov. 1973. 2 refs.*

Chlorobiphenyls in the ambient air are usually measured by overlapping the gas chromatograms obtained from experiments on standard gas chromatograms. But, as chlorobiphenyls in the sample may be chemically changed to another chlorine compound by pyrolysis, burning or ultraviolet irradiation, the overlapping process may not be accurate. A study of the relationship the number of chlorine molecules in compounds having peaks of KC-200-600 on the gas chromatogram and the relative molar sensitivities of chlorobiphenyls containing 1-6 chlorine atoms per molecule by mass spectrometry. Safe et. al. (1971) indicated the limitation of mass spectrometry due to the instability of first order fragmentations, but showed that the number of chlorine atoms in a chlorobiphenyl molecule may be determined by control of the ionization potential.

1971

53096 **APTIC NO. 76848**

Grigorov, N. O. and L. S. Ivlev

EXPERIMENTAL STUDY OF THE TRANSITION OF SOLID AEROSOL PARTICLES INTO DROPLET SIZE. *Vestn. Leningr. Univ., no. 16, 1971. 13 refs. Translated from Russian. Leo Kanner Associates, Redwood City, Calif., 17p., May 1, 1974.*

NTIS, DDC: ADA001497

Studies of the transition of solid aerosol particles to droplet size particles were performed using sodium chloride, quartz, and substances with different wetting angles such as talc and road dust. The transition of the solid aerosol particles to those of droplet size occurred at a lower humidity than that predicted by theory. The number of visible NaCl particles increased much faster than that for quartz. Wetting of the NaCl particles was facilitated by their hygroscopicity. The dependence of supersaturation on particle radius is shown for pure water and for various ammonium sulfate solutions.

EFFECTS-HUMAN HEALTH

1975

53097 **APTIC NO. 76766**

Antweiler, H., K. H. Kompch, and A. Brockhaus

INVESTIGATIONS ON THE INFLUENCE OF NO2 AND SO2 AS WELL AS A COMBINATION OF THE TWO GASES ON THE PRODUCTION OF PRECIPITATING ANTIBODIES IN GUINEA-PIGS. *(Untersuchungen zur Frage des Einflusses von NO2 und SO2 bzw. einer Kombination beider Gase auf die Bildung praezipitierender Antikoerper beim Meerschweinchen). Text in German. Zentralbl. Bakteriol. Hyg., Abt. Orig. B, 160(3):212-224, 1975. 41 refs.*

The influence of nitrogen dioxide and sulfur dioxide, or a combination of the two, on the production of precipitating antibodies was studied in guinea pigs. The gas concentration was 10 mg/cu m. Continuous exposure began 3 days before sensitization and lasted up to the testing date. Sensitization was done subcutaneously and intramuscularly with fresh chicken albumen plus complete Freund s adjuvans. Production of precipitating antibodies was tested by the double diffusion method of Ouchterlony. Total protein content was measured and an immunelectrophoretic separation of the protein fractions was performed with polyvalent anti-guinea pig serum. The statistical evaluation of the results yielded no support for an interaction of NO2 and SO2, or their combination, in the concentration used on the formation of precipitating bodies.

53098 **APTIC NO. 77355**

Aoyama, M. and T. Rokushika

RELATIONSHIP BETWEEN AIR POLLUTION AND FREQUENCY OF INHABITANTS S COMPLAINTS IN NAGOYA CITY. *(Nagoya shi ni okeru taiki-osen to shuso-ritsu no kankei). Text in Japanese. Koshu Eisei (Public Health), 39(3):173-177, March 1975. 14 refs.*

A survey of complaints of schoolchildren regarding air pollution was carried out in Nagoya City in the winter of 1971. Fifteen thousand two hundred and twenty-four primary school pupils, 10, 313 middle school pupils, as well as complaints of their parents were surveyed. The results were compared with the observed values of sulfur dioxide. The average percentage of complaints of air pollution around their residences was 38.5% in primary schoolchildren, and 39% in middle schoolchildren, with 93.9% as the highest and 2.1% as the lowest. The frequency of complaints of catching cold was highest, followed by nasolaryngeal symptoms and bronchitis in primary and middle schoolchildren, with a fairly large difference between schools. There was a positive correlation between thee percentage of complaints of air pollution around the residence and that of cold symptoms, a nasolargyngeal symptoms and bronchial symptoms. The frequency of air pollution around the residence coincided with the distribution of SO2, the frequency being very low in districts where the concentration of SO2 was less than 1.5 mg/day/100 sq m. There was a decrease in the percentage of complaints of air pollution in areas where the decrease of SO2 concentration was noticeable.

53099 **APTIC NO. 77608**

Einbrodt, H. J.

LIMIT VALUES AND EFFECTS OF PARTICULATE METALLIC AIR POLLUTANTS. *(Grenzwerte und Einwirkungen staubfoermiger metallischer Luftverunreinigungen). Text in German. Offentl Gesundheitswesen Stuttgart, 37(8):491-496, 1975. 24 refs.*

Limit value guidelines issued for lead, cadmium and zinc concentrations in the air by the Commission for Testing Hazardous Materials and by the VDI Commission for Clean Air Maintenance are discussed. The maximum allowable daily average lead concentration in the air is set at 3 microgram/cu m, based on assumptions that a blood lead level below 30 microgram/100 ml cannot be guaranteed at higher ambient concentrations. The yearly mean is set at 1.5 microgram/cu m. These limit values apply to particulate matter with a median size of 10 microns. Investigations of randomly selected children living in an area where the yearly average lead concentration in the air is below 1.5 microgram/cu m showed blood lead levels between 30 and 40 microgram/100 ml in 0.3% of all cases. The maximum allowable concentration of cadmium, established for 24-hr periods, is 0.05 microgram/cu m in view to the high toxicity of this element. The cadmium concentration in the renal cortex was selected as a biological criterion of cadmium exposure. The maximum allowable concentration value for zinc, an essential trace element, has been set at 0.1 mg/cu m, which is, however, toxic for certain domestic animals and plants.

53100 **APTIC NO. 77610**

Ettema, J. H. and R. L. Zielhuis

EFFECTS OF ALCOHOL, CARBON MONOXIDE AND TRICHLOROETHYLENE EXPOSURE ON MENTAL CAPACITY. *Int. Arch. Occup. Environ. Health, 35(2):117-132, 1975. 8 refs.*

Groups of adult male volunteers were exposed to alcohol, carbon monoxide or trichloroethylene. Performance in mental loading tests and effects on physiological parameters were studied. Using alcohol as a reference substance, producing marked effects at blood alcohol levels greater than 0.3 g/l, the effects of carbon monoxide and trichloroethylene in dosages encountered in daily and occupational life were much less severe. The experimental results apply only to the specific conditions of the study: healthy male adults 20-30 years of age, no vigilance tasks, no long-term exposure.

53101 **APTIC NO. 77339**

Fukuda, Shinji, Toru Yamamoto, Setsuko Iwamoto, Takanari Tokuhisa, Junichi Mise, and Yurizo Fujii

SERUM IGE VALUE OF PATIENTS SUFFERING FROM BRONCHIAL ASTHMA. ESPECIALLY ON ITS RELATIONSHIP TO AIR POLLUTION. *(Kikanshi- zensoku kanja ni okeru kessei IgE-chi. Tokuni taiki-osen to no kankei). Text in Japanese. Rinsho Meneki (Clin. Immunol.), 7(1):105-109, 1975. 15 refs.*

The relationship between the serum immunoglobulin E value and air pollution, especially atmospheric sulfur dioxide, was examined in 83 cases of bronchial asthma, 17 cases of chronic pulmonary emphysema, five cases of lung tuberculosis, and 37 healthy subjects. The bronchial asthma patients were divided into 38 cases of the allergic type, 16 cases of the non-allergic type, and 29 cases of questionable types. Their residence was classified according to air polluted areas (over 1.5 mg/day/100 sq cm), slightly polluted areas (1.0-1.5 mg/day/100 sq cm), and non-polluted areas (1.0 mg/day/100 sq cm, PbO2). Their serum IgE values were determined by a one step radioactive single radical immunodiffusion method. The serum IgE value for 83 cases of bronchial asthma was 785.4 + or - 1052.0 units/ml, with 39 cases being higher than 500 units/ml. The value for healthy subjects was 127.1 + or - 96.3 units/ml. In the allergic group, the value was 1179.6 + or - 1378.6; and in the non-allergic group, it was 222.9 + or - 239.5 units/ml. Serum IgE values did not show any difference with the degree of pollution; however, when the cases were differentiated into seasonal and year-round types, it showed higher values (more than 1000 units/ml) in polluted and slightly polluted residential areas. Air pollution appeared to aggravate rather than induce asthma.

53102 **APTIC NO. 77612**

Gibel, Wolfgang

NECESSITY AND TASKS OF PROPHYLACTIC CANCER RESEARCH. *(Notwendigkeit und Aufgabenstellung der praeventiven Krebsforschung). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. 10:138-147, 1975. 5 refs.*

Problems and tasks of prophylactic cancer research are outlined. Polycyclic aromatic hydrocarbons (such as benzo(a)pyrene), nickel, cadmium, chromium, arsenic, and asbestos are the principal carcinogenic air pollutants. The carcinogenic hazards due to benzo(a)pyrene and other polycyclic aromatic hydrocarbons, generated mainly in combustion and pyrolytic processes in industry, households, and transportation, can be reduced by the replacement of individual heating units by remote heating systems with improved combustion conditions, by reducing the overall coal consumption, by dust separation in industrial plants, and by design improvements, fuel additives, and catalytic exhaust cleaning in motor vehicles.

53103 **APTIC NO. 77526**

Girardi, F., L. Geotz, E. Sabbioni, E. Marafante, M. Merlini, E. Acerbi, C. Birattari, M. Castiglioni, and F. Resmini

PREPARATION OF PB-203 COMPOUNDS FOR STUDIES ON PATHWAY AND EFFECTS OF LEAD POLLUTION. *Intern. J. Appl. Radiation Isotopes, 26(5):267-277, May 1975. 21 refs.*

The preparation of the radioisotope lead-2O3 for use in studies on the pathway and effects of airborne lead pollution is described. Thallium targets are used in conjunction with the external proton beam of a cyclotron. The beam is collimated to a diameter of 6 mm, and the current is typically about 50 nanoamperes. Irradiation is made in air, thus providing suitable cooling for the targets which are 50-60 mg/sq cm thick. The irradiated stock consists of four Tl targets separated by alluminum foils. Applications of the radioisotope include studies on the fate of airborne lead particles resulting from the combustion of lead-containing gasoline, the lead distribution in lake waters, lead uptake by plants and zooplankton, the binding of lead by liver and kidney in rats, and the interaction of lead with alkaline phosphatase.

53104 **APTIC NO. 77328**

Hayatsu, H.

ON THE INJURY OF NUCLEIC ACIDS BY SULFUROUS ACID. *(Aryusan ga kakusan ni ataeru sonsho ni tsuite). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo, p. 182-183, June 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

Sulfurous acid was found to have a mutagenic effect on DNA in studies on nucleic acids at the molecular level, the microorganism level, and the cultured animal cell level. Sulfurous acid deaminized one of the nucleic bases, cytosine, to produce uracil catalytically in near-future aqueous solution at 37 C. The frequency of appearance of mutant C1 when the lambda phage was treated in 3M sodium hydrogen sulfite solution of a pH of 5.6 at 37 C for 90 min was 10 times that in the control. The mutagenesis of E. coli, T phage and S. cervisiae by sulfurous acid had been observed previously. Free radicals SO3 and 02H, which formed when sulfurous acid was oxidized by oxygen, injure the nucleic acid. Hydroquinone added to the system stopped the deactivation of DNA, supporting the radical injury theory. According to the experiments in which the effect of 10-4M sodium hydrogen sulfite on the cultured cells of Chinese hamster in the presence and the absence of manganic ion was examined, a relatively strong deactivation of the cells occurred only in the presence of manganic ion.

53105 **APTIC NO. 77566**

Henderson, W. J., G. Blundell, R. Richards, P. M. Hext, B. E. Volcani, and K. Griffiths

INGESTION OF TALC PARTICLES BY CULTURED LUNG FIBROBLASTS. *Environ. Res., 9(2):173-178, April 1975. 11 refs.*

Electron microscopic studies of the size of talc particles ingested by cultured rabbit lung fibroblasts are reported. Particles of talc up to 10 micron are observed in the cytoplasm of the fibroblasts, and the particles are generally ingested in the horizontal plane. Similar particle size ranges are observed at 26-hour and 8-day incubation periods. Although the talc particles readily penetrate the cell membrane, they do not appear to penetrate the nuclear membrane.

53106 **APTIC NO. 76788**

Hirai, K., M. Tokuda, T. Nishimura, M. Fujii, and M. Takashima

EFFECTS OF AIR POLLUTION ON CHILDREN IN KYOTO CITY. PART 2. ON THE DETERMINATION OF CONCENTRATION OF AIR POLLUTANT BY ALKALINE FILTER TAPE METHOD AND ON THE HEALTH EXAMINATION OF CHILDREN (1972). *(Kyoto-shini okeru taikiosenno jido ni oyobosu eikyo Dai 2-ho. Alkali roshi-ho ni yoru taikiosennodo no sokutei to jido no kenko-chosa ni tsuite showa 47 nendo). Text in Japanese. Nippon Koshu Eisei Zasshi (Jap. J. Public Health), 22(4):241-244, April 1975. 2 refs.*

The state of air pollution in Kyoto, Japan and the effects of air pollution on respiratory diseases in primary schoolchildren (19,480 pupils of the first grade) were investigated in 1972 following previous investigations in 1971 and 1970. The maximal, minimal, and average concentrations of sulfur oxides in November-December 1972 and in February-March 1973 were, respectively, 0.38, 0.02 and 0.136; 0.38, 0.04, and 0.185 mg sulfur trioxide/day/100 sq cm (by the alkaline filter paper method). The corresponding values of nitrogen dioxide were 0.124, 0.009, and 0.068; 0.080, 0.004, and 0.046 mg NO2/day/100 sq cm. The children screened for asthma by questionnaires were medically examined, with their lung function being determined by the peak flow value. A small increase in disturbed lung function was noticed (8.72% as compared to 7.93% in 1971). The peak flow value of 1477 children who showed minus appeared in 2.63% of the cases, not much different from that in 1971. Among 380 children who showed a minus value continuously from 1970 to 1972, about 2/3 were improved. The sulfur oxide concentration showed annual decreases, while nitrogen dioxide increased, probably due to an increase of motor vehicle traffic. The peak flow value was aggravated in children at schools situated along highways and roads.

53107 **APTIC NO. 77527**

Hunt, Vilma R. and William L. Cross

INFANT MORTALITY AND THE ENVIRONMENT OF A LESSER METROPOLITAN COUNTY: A STUDY BASED ON BIRTHS IN ONE CALENDAR YEAR. *Environ. Res., 9(2):135-151, April 1975. 11 refs.*

Infant mortality rates for the lesser metropolitan Dauphin County, Pennsylvania during the calendar year of 1970 were statistically analyzed in relation to month of the year, geographic location, and air quality. The infant mortalities during 1970 were concentrated in July, August, and September, with 35 occurring in contrast to 31 for the remaining 9 mo. The increased risk to infants born during those 3 mo appeared to be due to an adverse air environment that was established during the summer of 1970, particularly in Harrisburg, due in part to extreme air pollution episodes along the eastern seaboard of the United States. Clinical records of the mothers smoking habits were lacking. (Author abstract modified)

53108 **APTIC NO. 77494**

Ishikawa, T. and T. Yamamoto

ON HEALTH EXAMINATIONS AND AIR POLLUTION IN THE CASES OF LONG- DISTANCE RELAY RACES. *(Ekiden kyogi ni okeru kenkoshindan to taikiosen). Text in Japanese. Nihon Iji Shinpo (Japan. Med. J.), no. 2651:134-135, Feb. 1975. 5 refs.*

A pre-examination for epidemic diseases such as colds, body temperature, heartbeat, blood pressure, headache and abdominal pain should be done. Suspension of a race is necessary during the summer and during an outbreak of influenza. Care must be taken when carbon monoxide concentrations are greater than 20 ppm (8 hr average), when oxidant concentration is greater than 2.0 ppm, when nitrogen dioxide is greater than 0.15 ppm, when ozone is greater than 0.3 ppm, and when sulfur dioxide is greater than 0.03 ppm. Generally, races in heavy traffic areas must not be carried out, especially when there is photochemical smog. Care of the runners after the race should not be neglected.

53109 **APTIC NO. 76752**

Jaremin, Bogdan and Wiktor Szczekocki

THE INFLUENCE OF THE CORN DUST ON THE HUMAN BODY (A SURVEY OF LITERATURE). *Bull. Inst. Marit. Trop. Med. Gdynia, 26(1):43-51, 1975. 47 refs.*

Epidemiological studies and animal experiments on the influence of corn dust inhalation on the health of the organism are reviewed. Grain transport workers reported symptoms such as breathlessness, cough, and irritation of the conjunctival and nasal mucosa. Chest X-rays revealed reticular shadows, disseminated fibrosis of the lung stroma, and focal micronodular shadows. A case of pneumofibrosis in a miller was also reported. Most researchers believe that pneumopathies occurring in subjects exposed to corn dust possess an allergenic basis. Recent advances in immunological techniques confirm that organic dusts such as those from corn can generate allergic reactions which occur mostly as immediate type reactions, viz., asthmatic, mediated by immunoglobulins E (reagins) or immunoglobulins G (precipitins). However, the unequivocal results of studies on the allergenic role of corn dust and the question of the influence of silica in such dust require further research.

53110 **APTIC NO. 77331**

Kaneko, Y.

AIR POLLUTION AND INFANTILE NASAL DISEASES AND RAPIDLY INCREASED NASAL ALLERGY. *(Taikiosen to kodomo no hana no byoki -Kyugeki ni fueta hana allergy). Text in Japanese. Mainichi (Life), 6(10):83-87, Sept. 1975.*

The results of an epidemiological investigation on nasal diseases such as simple rhinitis, infantile nasal sinusitis, and nasal allergy on 4010 children in polluted and non-polluted areas are presented. Methods of investigation included questionnaires, examination of the nasal cavity by nasal specula, detection of allergen, intranasal induction, cytological diagnosis of pituita, and roentgenography. There was no difference in the morbidity of rhinitis in the two areas. Although the morbidity of nasal sinusitis increased in the polluted area, the cases were mainly acute or subacute in nature, in contrast to the chronic cases of 20 hr ago. The detailed survey of morbidity of nasal allergy revealed a more frequent occurrence of nasal allergy and allergy-like rhinitis in polluted areas. By inspection of allergic disposition, the percentage of positive reactions to intracutaneous injection of house dust and Ambrosia artemisiifolia extracts was about twice as large in the polluted area. Seventy to 80% of the people in the polluted area with a predisposition to allergy had nasal allergic symptoms, while only half that number in the non-polluted area had the same symptoms.

53111 **APTIC NO. 77387**

Kevany, John, Michael Rooney, and John Kennedy

HEALTH ASPECTS OF AIR POLLUTION IN DUBLIN. *Irish J. Med. Sci. (Ireland), 144(3):102-115, 1975. 18 refs.*

A study of the relationship between air pollution and specific health indicators in Dublin from 1970-73 was undertaken using partial correlation analysis. Smoke and sulfur dioxide, which are accepted as indicators of general pollution conditions, were the pollutants measured in the study. The indicators of health used were deaths and hospital admissions of elderly and chronically ill people due to cardiovascular and respiratory illness, other than influenza and tonsillitis. Because temperature is also known to affect cardiovascular and respiratory illness, maximum daily temperature was chosen as the controlled weather variable. Mortality for cardiovascular disease was significantly correlated with SO2 levels within the same 24 hr. Ischaemic heart disease was the major component of this correlation. There is a progressive positive correlation at increasing threshold levels. These correlations were not sustained with a lag period of two days nor in relation to smoke indicators at any lag period or threshold level. Mortality for respiratory disease was less consistently associated with air pollution than cardiovascular disease. Levels of SO2 up to 75 micrograms/cu m did not produce any significant response in terms of mortality. From 100 micrograms/cu m upwards there is a strong correlation with deaths from acute respiratory disease, principally acute bronchitis. At 150 micrograms/cu m threshold there is also a strong correlation with deaths from chronic bronchitis, emphysema and asthma. No significant correlations existed for smoke at any threshold or lag period. Implications for community health are discussed.

53112 **APTIC NO. 77419**

Kokata, S., H. Nemoto, M. Inukai, T. Ono, and T Suzuki

ACCIDENTAL DEATHS DUE TO OXYGEN DEFICIENT AIR IN A MANHOLE. *(Manhole nai no sanketsukuki ni kiinsuru jikoshirei). Text in Japanese. Nihon Hoigaku Zasshi (Japan. J. Legal Med., Tokyo), 28(5):406, 1975.*

An inspector of telephone cable pipe fell into a manhole at the bottom of which there were 80 cm of stagnant water, and fainted. Two other inspectors who tried to rescue him also fainted. All three died. There were no poisonous gases such as CO, hydrogen sulfide, methane, or ammonia present in the stagnant water. The death of the three inspectors was due indirectly to oxygen- deficient air in the manhole, the oxygen having been consumed by aquatic micro-organisms in the stagnant water.

53113 **APTIC NO. 76861**

Kosmider, Stanislaw, Waldemar Janiec, and Romuald Chrusciel

SULFUR (S35) METABOLISM IN RATS EXPOSED TO S35O2 CONTAINED IN THE AIR WITH SIMULTANEOUS USE OF THE METHOD OF S35O2 BINDING BY AMMONIA. *Int. Arch. Occup. Health, 35(1):67-79, 1975. 11 refs.*

Sulfur (S35) metabolism was traced in experimental investigations on rats, and the importance of the method for neutralizing sulfur dioxide with ammonia was estimated. Fifty-two rats were exposed to sulfur (35) dioxide by means of inhalation, and radioactivity in several organs at different periods of exposure was traced. Sulfur incorporation into proteins and mucopolysaccharides, as well as elimination of isotope with urine and feces at different periods of time after exposure, was also determined. The second group of animals was exposed to the products of S(35)O2 neutralized by ammonia. The ammonia decreased the amount of sulfur which could pass into the organism through the breathing of air contaminated by SO2. The use of S35O2 neutralized by ammonia produces a faster elimination of sulfur from the organism.

53114 **APTIC NO. 76862**

Magid, E. and M. Hilden

ELEVATED LEVELS OF BLOOD LEAD IN ALCOHOLIC LIVER DISEASE. *Int. Arch. Occup. Health, 35(1):61-65, 1975. 8 refs.*

In order to investigate the effect of alcohol intake on the activity of erythrocyte aminolevulinate dehydratase (ALA-D), serum alcohol concentration and ALA-D activity were determined in four groups of patients. The four groups included: 18 chronic alcoholics (active phase); 14 chronic alcoholics (inactive phase); 13 chronic alcoholics suffering from biopsy-verified cirrhosis; and 16 non-alcoholics with biopsy-verified cirrhosis. Blood lead concentrations were determined in all patients. ALAiD values were within the normal range in patients from Groups I, II, and IV. Eight patients from Group III had abnormally low ALA-D values, and four of these had elevated blood lead values. Data from Groups III and IV yielded a significant negative correlation between blood lead and ALA-D values. No correlation was demonstrated between serum alcohol and ALA-D values from Groups I and III. It is suggested that patients suffering from liver cirrhosis may accumulate lead at an increased rate and that alcohol intake in these patients may cause a release of lead from the liver to the blood and thereby a depression of ALA-D activity.

53115 **APTIC NO. 77609**

Medici, T. C. and S. Chodosch

THE RESISTANCE MECHANISM OF THE RESPIRATORY TRACT. *(Die Abwehrleistungen des Respirationstraktes). Text in German. Schweiz. Med. Wochenschr. (Basel), 105(31):965-970, 1975. 21 refs.*

The defenses of the lung against inhaled gases and particles include aerodynamic filtration mechanisms of the tracheobronchial tree, mechanical clearance, and local detoxification. Cough, mucociliary transport, alveolo-bronchiolar fluid flow, and clearance to lymph and blood participate in the mechanical excretory mechanisms whereas phagocytosis, immunologic and secretory mechanisms, and tissue reaction represent in-situ detoxification. Inpaired mucociliary transport causes obstruction of the airway, a symptom of chronic nonspecific lung disease. Clearance of airways may be accomplished by changing the physicochemical properties of the mucus or by stimulating ciliary activity.

53116 **APTIC NO. 77332**

Miyaji, K., H. Kashiwagi, Y. Karimata, K. Yoejima, and M. Yanagida

PROBLEMS RELATED TO PULMONARY OBSTRUCTIVE DISEASES WHICH OCCURRED IN THE POLLUTED ENVIRONMENT OF YOKKAICHI. *(Yokkaichi chiku no taikiosen kankyoka de hassho shita heisokusei hai shikkan no mondaiten). Text in Japanese. Preprint. Executive Committee for Symposium of Environmental Sciences, Tokyo, p. 235-236, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

The effect (E) of air pollutants on the body depends on the quantity (M), the property (Q) and the period of exposure (T), and the predisposition or condition (D) of the body in an equation: E equals fl(M,Q,T)f2(D). In the case of injury by a poison gas, even a normal person with D equals O receives destructive effects on his lung, because of the large amounts of M and Q. In environmental air pollution, although M and Q are very small, the effect may become severe because T is very large and D depends on physiological factors. In cases of obstructive pulmonary disease, the frequency of bronchial asthma was large and is still increasing. In Yokkaichi, the history of allergic disposition was low, that is, there is little correlation between D and E in the above equation. However, allergic susceptibility by house dust is growing by long exposure to air pollutants. Immunoglobulin E (IgE) was high in asthma in polluted areas and non-polluted areas. However, there was a negative correlation between IgE and IgG in asthmatic patients with more than 5 yr of disease history in air polluted areas with less than 400 units of IgE.

53117 **APTIC NO. 77418**

Motomiya, T., M. Adachi, and A. Yoshida

RELATIONSHIP BETWEEN MORBIDITIES OF BRONCHIAL ASTHMA, OCULAR DISEASES AND OTORHINAL DISEASES AND AIR POLLUTION OBSERVED IN SCHOOLCHILDREN IN CHIBA CITY. *(Chibashi sho-chugakko gakudoseito no kikanshizensoku, gankateki oyobi jibikateki shikkan no yushoritsu to taikiosen to no kankei). Text in Japanese. Nihon Koshu Eisei Zasshi (Japan. J. Public Health), 22(7):397-402, July 1975. 12 refs.*

A survey of morbidities of bronchial asthma, ocular diseases, and otorhinal diseases was done on 66,000 primary schoolchildren and middle school pupils in Chiba City. The city area was divided into 4 sections according to the degree of air pollution by sulfur oxides, and the relationship between the morbidities and air pollution was examined. The morbidity of bronchial asthma in male children increased as the degree of air pollution increased. There was a significant difference between the morbidities in female children in highly polluted, slightly polluted, and moderately polluted areas. No relationship was found between the morbidities of ocular and otorhinal diseases and air pollution. A significant positive correlation was found only between the morbidity of bronchial asthma in boys and the ambient sulfur oxides concentration. The number of cases of bronchial asthma in middle school pupils was not large enough to determine a relationship to air pollution.

53118 **APTIC NO. 77547**

Mustafa, Mohammad G.

INFLUENCE OF DIETARY VITAMIN E ON LUNG CELLULAR SENSITIVITY TO OZONE IN RATS. *Nutr. Rept. Intern., 11(6):473-476, June 1975. 10 refs.*

Possible protective effects of vitamin E on lung cellular sensitivity to ozone was examined in terms of alteration of lung cellular oxidative metabolism. Rats are fed a basal diet containing either 66 or 11 ppm vitamin E. After 5 wk rats from both groups are exposed to either 0.1 or 0.2 ppm O3 for 7 days, and O2 consumption was measured in lung homogenate using succinate as a substrate. There is a 17% increase of O2 consumption in the group that received high vitamin E and 0.2 ppm O3. There is no significant change at 0.1 ppm O3. In the group that received low vitamin E, the increases are 38% and 25%, respectively, for 0.2 and 0.1 ppm O3 exposure. Increased respiratory activity, which resulted from a proliferation of mitochondria, is a reflection of O3 mediated lung injury. The ability of animals to withstand oxidant stress is increased through dietary supplementation of vitamin E. (Author abstract modified)

53119 **APTIC NO. 77510**

Nagata, I., H. Asami, H. Oya, H. Isomura, S. Ono, S. Kido, A. Nagashima, H. Inoue, I. Takashima, H. Ota, H. Onda, H. Kodama, N. Kodama, T. Tanemura, and K. Niwa

ENVIRONMENTAL POLLUTION AND THE REACTION OF THE BODY, PART 3. EFFECTS OF AUTO EXHAUSTS ON THE BODY. *(Kankyo osen to seitai hanno Part 3. Jidosha haishitsu gas no seitai ni oyobosu eikyo). Text in Japanese. Jui Chikusan Shimpo (J. Vet. Med.), no. 643:749-759, July 1975. 5 refs.*

The results of an epidemiological survey done in 1973 on the effect of chronic exposure of inhabitants to minute amounts of sulfur and nitrogen oxides, carbon monoxide, hydrocarbons, dust, and lead in auto exhausts are presented. The survey was done in Ichinomiya and Toyohashi Cities in the Aichi Prefecture. Although there were some respiratory complaints and some abnormal X-ray findings, the mass value in both cities was in the normal range. No direct effect of auto exhausts on lung function was observed. Although some cases of anemia were observed in females, there was no evidence of a direct effect of lead on anemia. There were no cases of injury by lead. The carboxyhemoglobin levels were within safety levels in both cities.

53120 **APTIC NO. 77352**

Nagumo, K.

THE RELATIONSHIP BETWEEN PHOTOCHEMICAL SMOG AND LOCAL INHABITANTS. *(Kokagaku smogu to chiiki jumin). Text in Japanese. Koshu Eisei (Public Health), 39(3):165-171, March 1975. 11 refs.*

There are differences between Los Angeles-type photochemical smog and those occurring recently in Japan, especially in Tokyo. The oxidant theory itself can not explain Japanese photochemical smog. Recently, the human injuries due to photochemical smog have extended to 15 prefectures, with 328 alerts in 1973. From the occurrence of photochemical smog, it is clear that industries have a close causal relationship to photochemical smog.

53121 **APTIC NO. 77420**

Noda, A., M. Hirano, T. Konishi, and A. Yamashita

CLINICOSTATISTICAL OBSERVATIONS OF BRONCHIAL ASTHMA IN THE SHIZUOKA DISTRICT. *(Shizuoka chiku ni okeru kikanshi zensoku no rinshotokeigakuteki kansatsu). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), 13(5):307, 1975.*

A statistical investigation of 588 patients with bronchial asthma in the Shizuoka district was done. Children under 15 had a very high rate (74.3%) and there was no seasonal dependency. However, among adults, there were more paroxysms in the winter. While the petroleum complex and thermal power station had lower rates, the paper industry and areas with heavy traffic had higher rates.

53122 **APTIC NO. 77611**

Norpoth, K.

SOLVENT VAPORS AND LEAD COMPOUNDS CHANGE ENZYME ACTIVITY. *(Loesungsmitteldaempfe und Bleiverbindungen veraendern Enzymaktivitaeten). Text in German. Umschau Wiss. Tech., 75(14):449-450, 1975. 4 refs.*

After inhalation of low concentrations of hydrocarbon solvents such as benzene, dichloromethane, trichloroethylene and carbon tetrachloride, male Wistar rats showed increased activities of hepatic microsomal enzymes. Phenobarbital induction of such enzymes is inhibited after long-term ingestion of lead acetate during a 3-mo period.

53123 **APTIC NO. 77302**

Oshima, H.

THE EFFECTS OF AIR POLLUTION ON VISUAL ACUITY, THEIR SEASONAL TRANSLATION IN A YEAR, TOKYO. *(Taikiosen to shiryoku no koshi, Tokyotoshinchiiki ni okeru nenkan suii). Text in Japanese. Nihon Ganka Gakkai Zasshi (Acta Soc. Ophthamol. Jap.), Suppl. 79:34 Feb. 1975.*

Experiments were performed during every season from 1972 to 1974 to determine the effects of air pollution, including the effect of photochemical smog on visual acuity in the summer. Visible distance and illumination intensity in daytime were compared to concentrations of oxidant, floating particles, sulfur dioxide, nitric oxide, nitrogen dioxide and carbon monoxide. The diminution of visual acuity in summer smog was less than winter smog. However, it was smaller in slight air pollution, and also showed a different pattern. While the illumination intensity at noon was significantly related to the concentration of floating particles throughout the year, both the concentration of SO2 in winter and the concentration of oxidant in summer showed a significant correlation to the illumination intensity.

53124 **APTIC NO. 76769**

Pankow, D., W. Ponsold, W. Glatzel, and K. Tietze

COMBINED EFFECTS OF CARBON MONOXIDE PLUS SODIUM NITRITE OR CARBON TETRACHLORIDE ON THE SCIATIC MOTOR CONDUCTION VELOCITY OF RATS. *Int. Arch. Occup. Health, 35(1):81-88, 1975. 22 refs.*

Combined administrations of 0.2 or 0.4 mmol sodium nitrite/kg (intraperitoneal) and 1.2 mmol carbon monoxide/kg (subcutaneous), or administration of 1.2 mmol CO/kg alone decreased the sciatic motor conduction velocity of rats to the same degree. Pre-treatment of rats with 8.3 mmol carbon tetrachloride/kg per os did not affect the retardation of nerve conduction following CO intoxication. CO poisoning led to threshold values of motor conduction velocity; the additional toxic substances examined did not aggravate this effect.

53125 **APTIC NO. 77439**

Schramm, Tilo

CANCER PREVENTION THROUGH ENVIRONMENTAL PROTECTION. THEORETICAL AND EXPERIMENTAL PRINCIPLES CONCERNING MEASURES OF PRIMARY CANCER PROPHYLAXIS. *(Krebsverhuetung durch Umweltschutz. Theoretische und experimentelle Grundlagen fuer Massnahmen zur primaeren Krebsprophylaxe). Text in German. Technik und Umweltschutz Luft Waser Boden Laerm, no. 10:130-137, 1975. 8 refs.*

In the interest of a better understanding of the possibilities and limitations as well as the aims of preventive oncology, within the scope of environmental protection, short survey is presented of the current state of our knowledge about cancer, with special emphasis on carcinogenic chemical substances. The mechanisms of cancer-inducing chemicals at the organic and the molecular level are discussed.

53126 **APTIC NO. 77416**

Shida, S. and T. Yamagishi

TRANSIENT HIGH CONCENTRATIONS OF OXIDANT AND RESULTING INJURIES IN A CASE OF PHOTOCHEMICAL AIR POLLUTION. *(Kokagaku taikiosen ni okeru ikkasei konodo oxidanto to higai). Text in Japanese. Preprint, the Chemical Society of Japan:II-780, 1975. (Presented at the Chemical Society of Japan, Annual Meeting, 32nd, 1975.)*

Although the oxidant concentration is used to represent the degree of photochemical air pollution, the concentration generally does not coincide with the degree of health impairment. A case of transient high oxidant concentration which seems to be the cause of the inconsistency is described. On the afternoon of July 9, 1974, 130 pupils of a middle school were injured by photochemical smog. Oxidant concentrations (one hr average) at 12:00 and 1:00 were 0.117 and 0.114 ppm at a point 15 km windward of the school. On the other hand, at 11:50 at the same point, the highest instantaneous value was 0.26 ppm for a continuous 15 min. A high concentration of oxidant existed at the time.

53127 **APTIC NO. 77487**

Skuric, Zdenka, Eugenija Zuskin, and Fedor Valic

THE EFFECTS OF AEROSOLS IN COMMON USE ON THE VENTILATORY CAPACITY OF THE LUNGS. *Int. Arch. Arbeitsmed, 34(2):137-149, 1975. 30 refs. (Presented at The World Congress of Environmental Medicine and Biology, 1st, Paris, July 1-5, 1974.)*

A group of 17 volunteers were exposed to a body deodorant, an air freshener, an air disinfectant, a furniture polish, a spot remover, a shoe spray, a glass defroster, a hair spray, and, separately, to their volatile components. An immediate significant decrease in ventilatory capacity was recorded upon exposure to each of the sprays. The maximum drop in ventilatory function (FEV1.0) ranged from 3.3 to 7.4%, and that of maximum vital capacity (Vmax) 50% from 5.3 to 11.3%. Vmax 75% decreased the most sharply, reaching 20.9%, suggesting that a major effect on small airways. In the majority of cases, changes in ventilatory capacity following exposure to sprays were similar to those recorded upon exposure to their solvents. A significant drop in ventilatory capacity during a work shift was found in a group of hairdressers exposed to hair sprays. Decreases were more pronounced in Vmax 50% and 75% than in FEV1.0. It was found that sprays released histamine, but in quantities not likely to be inhaled in the normal use of sprays.

53128 **APTIC NO. 76749**

Stupfel, M.

BIORHYTHMS IN TOXICOLOGY AND PHARMACOLOGY. II. INFRADIAN BIORHYTHMS AND GENERAL DISCUSSION. *Biomedicine, 22(2):105-111, 1975. 84 refs.*

The significance of biorhythms (human and animal) in relation to health impairment and the action of drugs on the organism is discussed. Allergic circaseptan (weekly) rhythms are observed in certain industries where workers sensitize themselves by breathing respiratory allergens. The monday syndrome (dyspnea, cough, diminution of forced expiratory volume) is obvious in the cotton industry (byssinosis), for example. Urban pollution, especially if it is a consequence of automobile exhaust, also shows weekly trends in terms of hospital admissions. Circatrigintan (monthly) rhythms, which may be determined by planetary influences, appear to modify a persons reactions towards pharmacological and toxic agents. Workers seasonally exposed to pesticides present slight biological differences (basophiles and urine pH) in relation to circannual (seasonal) rhythms. Infrannual (pluriannual) rhythms may also be related to the health state of the organism and its response to exogenous agents.

53129 **APTIC NO. 77296**

Yokohama Municipal Univ. (Japan), School of Hygiene, Faculty of Medicine

ON THE EFFECTS OF OZONE AND ACROLEIN ON THE HUMAN BODY. *(Ozone oyobi acrolein no jintai e no eikyo ni tsuite). Text in Japanese. In: Status Quo and Countermeasures of Injuries Due to Photochemical Smog: p. 84-86, 1975.*

Five healthy male volunteers with vital capacities of 4.70, 3.30, 3.14, 3.70 and 6.00 l were exposed at 27.5-30 C, RH 50% to ozone at 0.1-0.23 ppm and to a mixture of ozone at 0.1-0.23 ppm and acrolein at 0.15-0.4 ppm in a chamber for 2 min, at rest on a chair and during exercise. Exposure did not affect the heartbeat either at rest or during exercise. Exposure to the mixture of ozone and acrolein at rest reduced the respiratory number and respiratory volume. Exposure to the ozone-acrolein mixture during exercise repressed respiration, with some exceptions of accentuation. The same exposure repressed ventilation volume/min. The depth of respiration (S/P) was reduced by the same exposure. The sensory stimulation symptoms showed large individual variations. No difference of FVC, FEC (one sec) and FEV (1.0%) before and after the exposure was observed. There were individual differences in susceptibility to ozone and acrolein. However, respiration was generally repressed when acrolein was added to ozone.

53130 **APTIC NO. 77297**

Yokohama Municipal Univ. (Japan), School of Public Health, Faculty of Medicine

ON THE EFFECT OF OZONE INHALATION ON THE PROTEIN SYNTHESIS IN THE LUNG. *(Ozone no kyunyu ni yoru hai no tanpaku seisei ni taisuru eikyo ni tsuite). Text in Japanese. In: Status Quo and Countermeasures of Injuries Due to Photochemical Smog: p. 90-91, 1975.*

After exposing female rabbits of the white New Zealand strain to ozone at predetermined concentrations for one and three hr, and one and two weeks, they were killed by decapitation. Their lungs were removed, sliced, and incubated with L-leucine-u-14C. Inhalation of ozone at 0.15 ppm did not affect the intake of leucine into protein no matter how long the inhalation time. Exposure at 0.50 ppm reduced the intake only after 2 weeks inhalation. At 1.00 ppm the intake was not affected after a short period of inhalation. However, continuous inhalation for 1 and 2 weeks reduced the intake. Continued inhalation for more than one week at 1:00 ppm inhibited the synthesis of the protein part of the active surface matter of the lung.

53131 **APTIC NO. 77298**

Yokohama Municipal Univ. (Japan), School of Hygiene, Faculty of Medicine

ON THE EFFECTS OF OZONE ON ERYTHROCYTES. *(Ozone no sekkekyu ni ataeru eikyo ni tsuite). Text in Japanese. In: Status Quo and Countermeasures of Injuries Due to Photochemical Smog: p. 88-90, April 1975.*

Male rats of the SD strain were exposed to ozone at various concentrations and their blood examined after exposure. When exposed to relatively high concentrations, reduced resistance of erythrocytes to osmotic pressure and hemolysis was observed. However, these phenomena were not observed following exposure at concentrations less than those of air pollution. By comparing the responses to aqueous solutions of sodium fluoride and sodium chloride, it was shown that ozone reacted upon the glycolytic system of the erythrocytes. Ozone s effect on the glycolytic system depended on the ozone concentration. Although the effect of ozone on the glycolysis of the erythrocytes did not directly appear, the effect on the shortening of the erythrocyte s life and degradability could not be neglected.

53132 **APTIC NO. 77299**

Yokohama Municipal Univ. (Japan), School of Public Health, Faculty of Medicine

STUDIES ON THE EFFECTS OF PHOTOCHEMICAL SMOG ON THE HUMAN BODY. PART 1. ON THE RESPIRATORY FUNCTION OF HEALTHY PERSONS AS SHOWN IN FLOW-VOLUME CURVES. *(Jintai eikyo chosa kenkyu 1. Flow- volume kyokusen ni yoru seijosha no kokyu kinochi ni tsuite). Text in Japanese. In: Status Quo and Countermeasures of Injuries Due to Photochemical Smog: p. 81-83, 1975.*

The flow-volume curves of expiration detect slight disturbances in respiratory function due to inhalation of ozone or nitrogen oxides. These curves were calculated for healthy persons as a diagnostic index for injuries due to photochemical smog. Variations in body height, body weight (and those values per body surface area), age, smoking habits, and position of the body during examination were taken into consideration. Standard curves were obtained by sex and by age.

53133 **APTIC NO. 77300**

Kanagawa Prefecture (Japan), Bureau of Environmental Protection

STATES OF OCCURRENCE OF INJURIES DUE TO PHOTOCHEMICAL SMOG PART 1. LOCALITY OF OCCURRENCE OF INJURIES DUE TO PHOTOCHEMICAL SMOG. PART 2. DETAILS OF THE INJURIES. *(Kokagaku kogai higai no hassei jokyo. Part 1. Kokagaku kogai no hassei chiiki, Part 2. Kokagaku kogai no naiyo). Text in Japanese. In: Status Quo and Countermeasures of Injuries Due to Photochemical Smog: p. 32-40, 1975.*

Nine hundred and forty-one people were injured by photochemical smog in the Kanagawa Prefecture in 1974 (fiscal year), including 450 in Kawasaki City, 204 in Yokohama City, 172 in Yokosuka City, and 57 in Hatano City. The frequency of occurrence of injury was 4 in the Kawasaki and Saiwai Wards, and 3 in the Nakahara and Takatsu Wards and Yokosuka City. The areas in which continued injuries occurred in the past four years were Yokohama, Kawasaki, Yokosuka, and Sagamihara Cities. Number of people injured was 13,183, 1383, 2562, and 941 in 1971, 1972, 1973 and 1974. The total daily number of injuries due to photochemical smog in the Kanagawa Prefecture was 15, the time being from 9:35 am to 4:30 pm, concentrated from 11 am to 3 pm. Of the 941 injured persons, 737 were injured at school and 146 at home. Of the 737 injured in school, 664 were in primary school, 71 were in middle school and 2 in high school. The places where injuries occurred included playgrounds (while exercising, 571 persons), outdoors (in working or walking, 188 persons), indoors (partially opened, 166 persons), and homes (22 persons). The major complaints of injured persons were typical of

Tokyo-type photochemical smog, all being transitory and not requiring hospitalization.

53134 **APTIC NO. 77327**

Yamaguchi Prefectural Research Inst. of Health

ON THE RESULTS OF INVESTIGATION ON HEALTH OF POLICEMEN IN OUTSIDE DUTY. *(Gaiki keisatsukan no kenko chosa seiseki ni tsuite). Text in Japanese. Yamaguchi-ken Eisei kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Inst. Health), no. 16:118-119. March 1975.*

The lead content of blood and the general health of policemen on outdoor duty were used as indices for the determination of the physical effects of auto exhausts. The investigation, carried out by questionnaire, included the following areas: subjective symptoms, examination of lead, hemoglobin, hematocrit, blood density, serum protein, ratio of A/G, blood sugar, cholesterol, GPT, alkaline phosphatase, urea-nitrogen, and Kunkel s turbidity. Nine hundred and nineteen policemen on outdoor duty on major roads in the Yamaguchi Prefecture were the subjects. The frequency of subjective symptoms was 20.9% for physical syndromes, 24.6% for nerve syndromes, and 15.5% for nerve sensation syndromes. No correlation was found between lead in the blood and blood density. No trend of anemia due to lead in auto exhausts was found. No special relationship was found between subjective symptoms and lead in the blood. No health impairment, such as anemia, was found, and the amount of lead in the blood was the same as in those of the normal, healthy population.

53135 **APTIC NO. 77516**

Kanto Region Pollution Control Promotion Headquarters (Japan), Air Pollution Division

ON ACIDIC RAINFALL (WET AIR POLLUTION) IN THE KANTO REGION. *(Kanto-chiho ni okeru iwayuru sansei-u (shissei taikiosen) ni tsuite). Text in Japanese. 76p., June 1975.*

The effects of the so-called acidic rainfall which occurred on July 3, 4, and 5, then sporadically until July 20, 1974 in the Kanto region on humans are described. The most common subjective symptoms were ocular ones, such as irritation and hyperemia of the eyes and tearing. In some areas, cutaneous symptoms such as skin irritation, especially on the upper extremities, were noticed. The concentration of sulfur dioxide on July 3, 4, 5, 17, and 18 was lower than usual, with some exceptions. The concentration of nitrogen dioxide on those days was also lower, with some exceptions. No direct relationship between human injuries and concentrations of ambient SO2 and NO2 was found. The atmosphere on those days was relatively stable, and this stability was, at least in part, the cause of health impairment. The pH of rainwater on July 4 - 5 was 3.0-6.7 in Tokyo, Tochigi, Kanagawa, Chiba, and Saitama.

1974

53136 **APTIC NO. 77326**

Fukuda, S., T. Tokuhisa, T. Yamamoto, K. Moriyama, J. Mise, Y. Fujii, and K. Tanaka

ON SERUM IGE VALUES OF PATIENTS SUFFERING FROM BRONCHIAL ASTHMA: ESPECIALLY ON THE RELATIONSHIP BETWEEN THOSE AND AIR POLLUTION. *(Kikanshi zensoku kanja ni okeru kessei IgE-chi-tokuni taiki osen tono kankei). Text in Japanese. 11p., April 1974. (Presented at the Japan Society Chest Diseases, Annual Meeting, 14th, Tokyo, Japan, April 2-3, 1974.)*

Serum IgE values were determined in patients suffering from bronchial asthma, chronic pulmonary emphysema, and pulmonary tuberculosis, and in healthy persons, focusing on bronchial asthma patients. The serum IgE value was determined by the method of one-step single radial immunodiffusion of Ito. In this method, a comparison was made of a sedimented ring made on agar plates which was made from agarose with purified 125I-labelled anti-human IgE of sheep. The serum IgE level in bronchial asthma patients (83 cases) was clearly higher than that of patients with other diseases and of healthy persons. The percentage of cases which showed more than 500 U/ml, 47, 0, 0, and 29, respectively, in patients with bronchial asthma, pulmonary tuberculosis and emphysema, and in healthy persons. When the data was classified into allergic and non-allergic types of bronchial asthma, the value of the former averaged 1179.6 + or - 223.7, and that of the latter averaged 222.9 + or - 59.9 U/ml. No difference of IgE values was found in air polluted, slightly polluted, and non-polluted areas. There were more cases which showed high serum IgE values in the perennial symptom group than in the seasonal symptom group, and all six cases which showed values over 1000 U/ml were included in perennial symptom group. No consistent relationship was found between the results of lung function examinations and serum IgE values.

53137 **APTIC NO. 77544**

Ghosh, D. K. and G. D. Agrawal

ADVERSE EFFECTS OF AIR POLLUTION ON HUMAN HEALTH WITH PARTICULAR REFERENCE TO RESPIRATORY DISEASES. *J. Inst. Engrs. (India) (Calcutta), 55(Part PH 1):5-7, Oct. 1974. 3 refs. (Presented at the Seminar on Recent Developments in the Field of Public Health Engineering, Hyderabad, India, Oct. 21-22, 1973.)*

The health effects of air pollution are discussed with particular reference to respiratory diseases. Continuous exposure of 30 ppm of carbon monoxide for 8 hr or 120 ppm for 1.0 hr causes interference with oxygen transport by blood. Ozone at 1.0 ppm for 8 hr daily for about a yr, can produce bronchitis and fibrositis in rodents. In man, a value of 2 ppm of O3 for 1 hr may produce serious interference with functioning in healthy persons. A 5 ppm concentration of SO2 for 1.0 hr causes bronchoconstriction in human subjects. Added particulate matter even with lower SO2 concentrations in air make the effect on human health worse due to joint or synergistic action, or an unusual sensitivity of certain individuals. Carbon particles on lung surface adsorb SO2 helping it to penetrate deeper into the tissue and thereby may act as a predisposing factor to acute respiratory infections, such as colds, bronchitis, and pnuemonia, and may also help chronic respiratory infections as well. Particles of arsenic, lead, cadmium, beryllium, chromium, manganese, and some polycyclic hydrocarbons in the atmosphere could cause cancer and cardiac disease. Chronic bronchitis and pulmonary infections are the common results of polluted air.

53138 **APTIC NO. 77469**

Gordus, Adon A., Cathy M. Wysocki, Cornelius C. Maher, III, and Richard C. Wieland

TRACE-ELEMENT CONTENT OF HAIR: VARIATION ALONG STRANDS AND AS A FUNCTION OF HAIR-WASH FREQUENCY. *Preprint, National Science Foundation, Washington, D. C., RANN Div., 4p., 1974. 6 refs. (Presented at the Trace Contaminants Conference, 2nd, Asilomar, Calif., Aug. 29-31, 1974.)*

Factors affecting the trace element content of human hair were investigated using hair samples from live subjects and historical hair samples to determine variables that must be considered when using hair analysis data for trace element exposure evaluations. The hair content of all elements tested increased at progressing distances from the scalp. Since historical samples frequently represent clippings of distal hair segments, reevaluations of historical hair sample data in relation to present day human exposure are needed. Some trace elements, particularly sodium and chlorine, exhibited length- content variation patterns. Although external airborne contamination might be responsible for such variations, it appears that sweat plays the prominent role in this variation. The hair of people who infrequently washed their hair showed statistically significant larger trace element contents than those measured in hair from frequent washers, except for magnesium and calcium which are precipitated from water during hair washing.

53139 **APTIC NO. 76909**

Imai, M., H. Oshima, F. Kawagishi, K. Yoshida, and M. Kitabatake

ON THE EFFECTS OF AIR POLLUTION ON HUMAN BODIES, ESPECIALLY CHILDREN AND ADULT WORKMEN. *(Taikiosen no jintai ni oyobosu eikyo ni tsuite, shoni to seijinko). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):219, Nov. 1974.*

The state of receiving medical examination, the change of clinical symptoms of young patients appointed as victims of air pollution, and the effects of air pollution on high school pupils were investigated in the northern part of Mie Prefecture. According to the answers to questionnaires, the number of pupils who complained of cough, sputum, and asthmatic paroxysm was a little more in those who live in the officially appointed area where air is polluted than in those who live outside the area (however, not significantly). There was no difference of morbidity of Fletcher s chronic bronchitis between those who live in and live out of the area.

53140 **APTIC NO. 77431**

Maruya, H.

AIR POLLUTION AND HEALTH DAMAGE IN MIZUSHIMA DISTRICT. *(Mizushima chiku ni okeru taiki osen to kenko higai). Text in Japanese. Preprint, p. 5-6, June 1974. (Presented at the Domestic Symposium of Internat. Environmental Preservation Science Conference, Annual Meeting, 2nd, Tokyo, Japan, June 13-15, 1974, p. 5-6.)*

Mizushima is a large industrial district facing the Japan inland seat (Setonai-kai), having about 70 steel, shipbuilding, transportation machinery, and petrochemical factories, with a total production 2.8 billion dollars/year (1972). The first sign of air pollution by sulfur dioxide was in February 1969, when many people began to suffer from asthma and bronchitis. The number of hospitalized patients with asthmatic symptoms has increased since 1961. The age of these hospitalized patients decreases yearly, and the number of re-hospitalized asthma patients is increasing. The number of patients with bronchitic asthma increased suddenly since 1969. According to the results of an investigation by the Kurashiki Medical Assoc. on 10,000 schoolchildren in December 1962 and June 1963, it was found that there were many complaints not only of chronic bronchitis with cough but also asthma as well as various eye, nose, and throat complaints.

53141 **APTIC NO. 77538**

Miyoshi, Y.

DEFENSE MECHANISMS OF THE AIRWAY SYSTEM AGAINST INFECTION AND AIR POLLUTION. *(Kidokei kansen osen no bogyo kiko). Text in Japanese. Nihon Kikan Shokudo-ka Gakkai Kaiho (J. Japan. Broncho- Esophagolog. Soc.), 25(4):165-166, Sept. 1974. (Presented at the Japan Broncho-Esophagological Society, Annual Meeting, 26th, Hirosaki, Japan, Sept. 7-8, 1974.)*

The numbber of cases of respiratory disease is increasing although the amount of sulfur dioxide in the air in Yokkaichi is decreasing. The relationship between the effects of air pollution on the airway and defense mechanisms such as phonofunction, infection, the immune system, cilial function, and the production of interferon was studied. The photo-function of officially recognized patients having obstructie pulmonary diseases due to air pollution was the same as in patients with obstructive pulmonary diseases living in unpolluted areas. Examinations with regard to aerodynamic factors, however, revealed nearly the same type of vibration of the vocal cords as that found in patients suffering from chronic laryngitis. The dynamic changes of tracheal epithelial cells of mice exposed to SO2 at 0.1-0.03 ppm included the apparent increase of DNA synthesis in the basal layer after one week, followed by a return to the original value after three weeks of exposure. This was followed by the appearance of cilial epithelium having many PAS-positive cells making the mice adaptive to stimulation by SO2. Transnasal inoculation of influenza virus PR8 produced more inflammatory symptoms in SO2-exposed mice than in controls and more rapid propagation to olfactory epithelium. The antibody value in the blood increased to a higher maximum after 7 days in the exposed animals than in controls, in which the maximum appeared after 14 days. The serum IgG of a mouse exposed to nitrogen dioxide in the mother s body and one month after birth showed a conspicuous change at 3-4 wk of age. The IgA levels in the parotidal saliva of children in air polluted areas were lower than in children in unpolluted areas.

53142 **APTIC NO. 76857**

Phalen, Robert F.

SUMMARY OF A RESPIRATORY TRACT MORPHOLOGY CONFERENCE. *Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex., Inhalation Toxicology Research Inst., Atomic Energy Commission Contract AT(29-2)1013, Rept. UC-48, 27p., June 1974. (Presented at the Respiratory Tract Morphology Conference, Albuquerque, N. Mex., May 7-8, 1973.)*

NTIS: LF-47

The mammalian respiratory system is discussed in terms of being a portal of entry for toxic agents in the atmosphere and a target site for several disease processes. Morphological studies on animals and humans concerning the respiratory bronchiole as a critical site for lung pathology, the importance of the larynx in causing increased particle deposition within the tracheobronchial tree, the need for considering secondary air-flow patterns that occur throughout the lung during breathing, descriptive models of the respiratory system, the effect of ozone exposure on the respiratory tract, species similarities and differences, the effects of age on respiratory disturbance, and the generation of monodisperse aerosols for physical modeling are reported.

53143 **APTIC NO. 77447**

Rockwell, Thomas H., Robert L. Wick, Jr., and K. N. Balasubramanian

EFFECTS OF NOXIOUS GASES ON DRIVER PERFORMANCE. *Ohio State Univ., Columbus, Ohio, Systems Research Group, Dept. of Transportation Contract DOT-HS-115-3-772, Rept. DOT HS-801 235, 156p., Oct. 1974. 128 refs.*

NTIS: PB-237-067

The nighttime driving performance of five healthy young drivers and five healthy aged drivers under the influence of CO (12% carboxyhemoglobin (COHb) level) was investigated. Driving tasks included freeway driving, sign reading, car following, curve negotiation in rural roads, and novel occlusion tasks. The important performance measures studied were related to drivers visual behavior, spare visual capacity, velocity mean and variability, headway mean and variability, and peak lateral acceleration in curves. The young subjects were significantly affected in their visual search and control behavior, and in their physiological measures in terms of mean heart rate due to COHb effects. The visual search behavior of the aged subjects was affected differentially compared to the young at elevated COHb levels. Significant differences between subjects were age related but the combined age-COHb effects were rarely additive. The report also presents the results from driving tests, field sampling surveys to determine COHb levels of drivers, and sample NOx levels inside automobiles. (Author abstract modified)

53144

APTIC NO. 77470

Stephens, R. J., M. F. Sloan, M. J. Evans, and G. Freeman

ALVEOLAR TYPE 1 CELL RESPONSE TO EXPOSURE TO 0.5 PPM O3 FOR SHORT PERIODS. *Exp. Mol Pathol., vol 20:11-23, Feb. 1974. 22 refs.*

Young male Sprague-Dawley rats were exposed for periods of 2-6 hr to 0.5 ppm ozone and then sacrificed for histological examination of the alveolar tissue. The alveolar lining epithelium immediately beyond the cuboidal epithelium of the terminal bronchiole was examined in particular. Alveolar type 1 cells were severely injured in contrast to type 2 cells and endothelium in the same region which were very resistant to O3 damage. The first recognizable change in the type 1 cells was a mild swelling in the attenuated peripheral cytoplasm. This process continued to increase in severity until it was quite pronounced. Mitochondria, both in the attenuated portions of the cell and in areas around the nucleus became progressively swollen until they were scarcely recognizable. This was followed either by a sloughing away of the entire cell from the basement lamina or by rupture of the plasma membrane and disintegration of the cell, leaving the basement lamina devoid of an epithelial covering. The endothelium on the opposite side of the basement membrane usually remained normal in appearance. (Author abstract modified)

53145

APTIC NO. 77536

Takayama, O.

CHARACTERISTICS OF POLLUTION AND INFECTION, ESPECIALLY IN THE UPPER RESPIRATORY TRACT. *(Tokuni jokido ni okeru osen to kansen no tokucho). Text in Japanese. Nihon Kikan Shokudo-ka Gakkai Kaiho (J. Japan. Broncho-Esophagolog. Soc.), 25(4):163-164, Sept. 1974. (Presented at the Japan Broncho-Esophagological Society, Annual Meeting, 26th, Hirosaki, Japan, Sept. 7-8, 1974.)*

The protective mechanism of the upper airway against air pollution and infection, macroscopic changes, and the pathological and pathophysiological changes were studied. During periods of air pollution, especially photochemical smog, symptoms of school age children were observed. The children were divided into two classes. In one, symptoms of the upper airway frequently appeared, and in the other these symptoms did not appear. On the of pathophysiological reactions when the nasal musosa was directly stimulated by 25% ammonia, which simulated the odor accompanying photochemical smog, was a change in the diameter of the trachea. Dogs exposed to gaseous ammonia also showed a change in the diameter of the trachea.

53146

APTIC NO. 76787

Takemoto, Kazuo, Hideo Kawai, and Harukazu Endo

EFFECTS OF ATMOSPHERIC POLLUTION ON RESPIRATORY ORGANS (IV). LUNG POLLUTION IN PIGEONS, CATEGORIZED BY REGION AND AGE. *(Taiki osen no kokyuki ni oyobosu eikyo (IV). Hato no chiikibetsu, nonreibetsu hai osendo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):345, Nov. 1974. (Presented at the Japan Society of Air Pollution, National Meeting, 15th, Paper 200.)*

Autopsies were performed on respiratory organs of 823 pigeons to determine the effect of air pollution on their lungs according to age (under 1 yr to over 4 yr) and habitat. Histological studies were made on lungs (vertical and horizontal sections) and trachea) vertical slitting). Three types of habitats were selected: Tokyo (commercial); Tsurumi and Kawasaki regions in Kanagawa Prefecture (industrial); and Saitama, Chiba, Ibaraki, Gunma (residential). Five levels of lung pollution were defined with respect to the amount of dust and pattern of dust concentration in the bronchial tubes and near the alveoli. Of the 503 pigeons from the Tokyo region, 33 pigeons (6.6%) showed evidence of the two highest levels of pollution. For the industrial regions, out of 193 pigeons, 23 were similarly affected. For the residential regions, 1 pigeon out of 127 showed evidence of the second highest level of pollution. This pigeon was over 4 yr old. In the commercial and industrial regions, effects of lung pollution increased with age. Pollution effects on pigeon lungs are probably 10 times those on human lungs. The simple nasal cavity structure in pigeons of emphysematous changes in the lungs was absent.

53147

APTIC NO. 77303

Yasuda, T.

STUDIES ON INFANTILE RESPIRATORY RESISTANCE, PART 1. RESPIRATORY RESISTANCE OF SCHOOLCHILDREN AND THE EFFECTS OF AIR POLLUTION ON THE RESISTANCE. *(Shoni no kokyuteiko ni kansuru kenkyu, Dai- ippen, Gakudo no kokyuteiko to sore ni oyobosu taikiosen no eikyo ni tsuite). Text in Japanese. Nihon Ikadaigaku Zasshi (J. Nippon Med. Sch.), 41(6):301-308, Dec. 1974. 50 refs.*

Respiratory resistance values by the oscillation method and peak- flow values were determined in 1215 pupils in a polluted area (Kawasaki City) and 612 pupils in an unpolluted area (Gumma Prefecture). The degree of correlation between the two values and height, weight, and body surface was greatest in body height, negative to respiratory resistance, and positive to peak-flow. Of 500 healthy children, the formulae which give expected values were obtained with height as a variable. Respiratory resistance tended to be slightly higher than expected in both sexes in polluted areas, with significant values in some areas. Respiratory resistance increased more in polluted areas than in unpolluted areas. No significant difference of peak-flow was observed between the two areas. A negative correlation was found between values of respiratory resistance and peak-flow. However, the peak-flow method was not appropriate for examination of potential and slight airway obstruction. The oscillation method for determination of respiratory function was found to be a simple, accurate, and sensitive method. There were more cases of increased respiratory resistance due to airway obstruction among children in polluted areas, suggesting that air pollution could be one of the causes.

53148

APTIC NO. 76819

Ikuyukai Inst. Environmental Pollution (Japan)

ON THE CORRELATION BETWEEN CONCENTRATION OF NITROGEN DIOXIDE AND HUMAN HEALTH AND LIVING ENVIRONMENT. *(Nisanka chisso nodo to kenko. Seikatsu kankyo no sokan ni tsuite). Text in Japanese. Ikuyukai Kogai Kenkyusho Shoho (Rep. Ikuyukai Inst. Environ. Pollut.), no. 9:7-35, July 1974.*

Nitrogen dioxide measurements and health surveys were performed in three wards of Yokohama, Japan from April 1 to April 8, 1974. The number of inhabitants investigated was 109 (77% women and 23% men). Their stage of health showed a fairly good correlation with the distribution of NO2 (average 0.038 ppm, minimum of 0.025 ppm, maximum of 0.055 ppm). The distribution of the frequency of subjective symptoms of the pharynx, eye, and nose also showed a fairly good correlation with the NO2 distribution.

53149

APTIC NO. 77307

Mie Prefectural Office (Japan)

THE RELIEF MEASURE OF HUMAN DISTURBANCE DUE TO ENVIRONMENTAL POLLUTION VII. HEALTH EXAMINATION OF INHABITANTS IN YOKKAICHI CITY. *(Kogai higai no kyusai taisaku, VII. Jumin kenko chosa). Text in Japanese. In: Environmental White Paper 1974, Mie Prefecture, p. 243-263, 1974.*

In order to locate people suffering from respiratory diseases, a question and answer system has been conducted since 1968. In 1973, 31,871 inhabitants in several parts of Yokkaichi City were surveyed and the persons who gave positive responses were examined medically, including women in pregnancy and infants. Air pollutants were investigated and monitored. The diseases investigated were colds, influenza, acute and chronic bronchitis, asthmatic bronchitis, bronchial asthma, emphysema, and pneumonia. The correlation of acute respiratory diseases and air pollution, which was high in the past, had decreased. The correlation of asthmatic diseases in infants had also decreased. However, in middle-aged and older persons the correlation was still high. The correlation of chronic respiratory diseases was in general, still high, the correlation of obstructive lung diseases was still high.

53150 **APTIC NO. 77337**

Suginami Ward, Tokyo (Japan)

INVESTIGATION OF THE ENVIRONMENT, HEALTH, AND ECONOMIC ACTIVITIES AFFECTED BY ENVIRONMENTAL DAMAGE DUE TO KOSHU-HIGHWAY AND SPEEDWAY NO. 4. *(Koshu kaido oyobi kosoku 4go doro kogai ni kakaru seikatsu kankyo to chosa). Text in Japanese. 102p., March 1974.*

The area along the both sides of Koshu Highway and Speedway No. 4 was divided into A (facing the road), B (within 20 m of the road), C (within 40 m of the road) and D (within 60 m of the road) in the Suginami Ward. The environment, health, and economical activities of the inhabitants who live in areas A, B, C, and D affected by the traffic on both roads were investigated by personal interview. The effects of air pollution by traffic on both roads on the health were headache, eye irritation, throat problems, and nausea. The frequency of these symptoms in groups A, B, C, and D were 18, 9, 4, and 5% (headache, 27, 15, 11, and 8% (eye irritation) 33, 19, 12 and 9% (throat problems), and 13, 4, 3, and 1% (nausea).

53151 **APTIC NO. 77364**

Bureau of Public Health and Environmental Pollution, Himeji (Japan), Himeji Municipal Office and Medical Assoc.

SURVEY OF ASTHMA AMONG ALL CHILDREN IN PRIMARY, SECONDARY AND MUNICIPAL HIGH SCHOOLS IN HIMEJI CITY. *(Honshi zen shogakko, chugakko oyobi shiritsu koko jido seito chu no zensoku chosa). Text in Japanese. In: Report on Survey on the Influence of Air Pollution, p. 103-117, 1974.*

The objects of the present survey were children in primary schools (41,340), those in secondary schools (17,399), those in municipal high schools (3300), and those in nursing schools (132). The total number of children and schools were respectively, 62,111 and 78. The numbers of asthmatic patients in the aforementioned schools (in order) were 416 (1.01%/1.35 in 1972), 128 (0.74%/1.10), 5 (0.15%/0.45) and 1 (0.75%/1.29). Falling dust, floating dust and sulfur oxides in air decrease yearly and are lower than the standard. The morbidity rate of asthma increased during 1974. The morbidity rate was higher among young children. The morbidity was higher in the coastal district, which coincides with the amount of air pollution. The morbidity rate of asthma due most probably to air pollution was 17.1%.

1973

53152 **APTIC NO. 77354**

Minami, I.

REPORT OF ENTRUSTED SURVEY ON THE INFLUENCE OF AIR POLLUTION, 1972. *(Taikiosen ni yoru eikyo chosa hokokusho). Text in Japanese. In: Report of Survey on the Influence of Air Pollution, 65p., 1973.*

A survey conducted by the Kochi Branch of the Tuberculosis Prevention Society was carried out in three stages. First a questionnaire on the influence of air pollution on humans was distributed to 733 housewives in relatively polluted areas and to 303 housewives in unpolluted areas. The ages ranged from 30 to 60 yr. A medical examination was performed on 108 wives with cough and sputum and detailed examinations were performed on 11 wives. The number of wives with continued cough and sputum for more than a month was about two times larger in air polluted areas than in polluted areas, regardless of smoking habits. However, no abnormal findings were obtained by roentgenography, lung function by spirometer, ECG, and personal medical examination. There were no diseases due specifically to air pollution because of the lack of objective findings.

53153 **APTIC NO. 77341**

Fukushima Ward Health Center, Osaka City (Japan)

ON THE EFFECTS OF AIR POLLUTION ON THE HEALTH OF REGIONAL INHABITANTS - PART 1. SURVEY OF DISEASE STATE BY ENQUETE. *(Taiki osen ga chiiki jumin no kenko ni oyobosu eikyo ni tsuitedai ippo: anketo ni yoru shojo chosa). Text in Japanese. 27p., Sept. 1973.*

From May to July 1972, the disease states of 2096 inhabitants (710 men and 1386 women) in the Fukushima Ward of Osaka City, where the concentration of sulfur trioxide in the air was (yearly average) 1.81 mg/day/100 sq cm and that of carbon monoxide was 5.3 ppm, and that of nitrogen dioxide was 5.3 ppm, were surveyed. The number of persons surveyed was 2.9% of all the inhabitants of the Ward. Twenty-two point one percent were in their thirties, 20.1% in their forties, 16.5% in their sixties, and 15.3% in their fifties. Those who experienced chest diseases were 2.9% of the total, and those with heart diseases were 1.5%. Non-smoking men were 31.7% of the total. The percentage of long- term complaints of cough and sputum was 11.8% in the eastern section, 11.2% in the northern section, 10.0% in southern section, 6.8% in the western section of the Ward. The frequency of complaints was highest in the sixties (12.7%), followed by 11.5% in the fifties, 11.3% in the thirties, and 8.6% in the forties. The frequency of complaints from men was 11.1% and that from women was 6%. The frequency of complaints was 19.8% in smokers, 8.5% in those who smoked less, and 6.8% in non-smokers. The frequency of complaints classified by residential area showed 12.6% in industrial areas, and 7.8% in residential and commercial areas. The frequency of complaints of inhabitants who live along National Road No. 2 was relatively high, ranging from 15.0 to 18.8%, and the frequency of complaints of inhabitants was apparently higher than those of people who only work in the Ward.

53154 **APTIC NO. 77353**

Bureau of Public Health and Environmental Pollution, Osaka (Japan), Osaka Municipal Office

COLLECTED MATERIALS ON INJURIES DUE TO PHOTOCHEMICAL OXIDANTS. *(Kokagaku oxidanto higai ni kansuru shiryo shu). Text in Japanese. 22p., 1973.*

Materials were cited from medical weekly news, commercial newspapers, medical journals, reports of official medical research laboratories, and official notices issued from municipal offices on the effects of photochemical oxidants and smog, on the origin of photochemical oxidants, and on the diagnosis and treatment of patients suffering from photochemical oxidants. The common symptoms in patients of Tokyo and Osaka included ocular symptoms such as pain in eyes and lachrymation, pain in the throat and airways, pulmonary symptoms such as cough, dyspnea, general symptoms such as headache, dizziness, nausea, vomiting, chills, pyrexia and malaise neurological symptoms such as numbness in extremities, spasm and disturbance of consciousness, and peripheral vasodilatory symptoms. Three cases of human injuries due to photochemical oxidants in Osaka were cited.

53155 **APTIC NO. 77356**

Bureau of Public Health and Environmental Pollution, Himeji (Japan), Himeji Municipal Office, and Medical Assoc.

RESULTS OF SURVEY ON PRIMARY SCHOOLCHILDREN SEC. 1 RESULT OF EXAMINATION OF LUNG FUNCTION. *(Shogakko-jido o taisho to suru eikyo chosa). Text in Japanese. In: Report of Survey on the Influence of Air Pollution on Health, p. 61-73, 1973.*

The respiratory resistance of 1105 pupils was measured in 1973 using a peak flowmeter. The results are summarized by areas having different atmospheric conditions. A coastal industrial area, a commercial area, a highly polluted agricultural area, and a rural area were surveyed. The respiratory resistance determined was classified into four categories: well above-average respiratory resistance, slightly above-average, slightly below-average, and well below-average. There was no apparent difference in respiratory resistance by areas. Girls, however, showed poorer respiratory resistance than boys. The percentages of boys in the four categories were: 7.2% well above-average, 35.3% slightly above-average, 38.2% slightly below-average, and 19.3% well below-average. The percentages of girls were: 3.9%, 13.5%, 41.8%, and 40.8%, respectively. No yearly trend was observed in children's respiratory resistance. However, poorer respiratory resistance was found in 1973 than in 1972 for female students.

53156 **APTIC NO. 77357**

Bureau of Public Health and Environmental Pollution, Himeji (Japan), Himeji Municipal Office and Medical Assoc.

SURVEY OF DISEASES OBJECTIVE OF NATIONAL HEALTH INSURANCE BY THE DETAILED BILL. *(Kokumin hoken seikyu meisaisho ni yoru taisho shitsubyo chosa). Text in Japanese. In: Report of Survey on the Influence of Air Pollution, p. 52-60, 1973.*

The status quo of diseases dur to air pollution was surveyed by examining the detailed bill for chronic bronchitis, asthma-like bronchitis, asthma, and lung cancer. The insured were classified by age and sex, and taken from the population in April 1973. Of the 21,620 insured, the morbidity rates of chronic bronchitis, asthma-like bronchitis, and asthma were respectively, 3.1% (3.0), 4.6% (6.1) and 3.9% (5.4) (the figures in parenthesis are those from 1972). Locally, the morbidity rates of chronic bronchitis were 3.9% (3.6) in coastal industrial areas, 3.6% (4.3) in rural areas, 2.3% (1.8) in older cities, and 1.0% (1.0) in other rural areas. The morbidity rates of asthmatic diseases in the aforementioned areas were 5.2% (8.3), 5.0% (5.1), 4.2% (4.3), and 2.2% (2.9). The morbidity rate of asthma in these areas were 3.8% (6.7), 5.3% (4.3), 4.5% (4.6), and 1.5% (3.3). Monthly variations in morbidity rates were not observed. The morbidity rates of asthma-like bronchitis and asthma decreased in 1973.

53157 **APTIC NO. 77358**

Bureau of Public Health and Environmental Pollution, Himeji (Japan), Himeji Municipal Office and Medical Assoc.

RESULT OF SURVEY ON ABSENCE FROM SCHOOL. *(Kesseki jokyo chosa). Text in Japanese. In: Report of Survey on the Influence of Air Pollution on Health, p. 74-83, 1973.*

The frequencies of absences from primary schools in Himeji were investigated. The frequencies were classified according to respiratory diseases, gastrointestinal diseases, epidemic diseases, and external injuries, during a one-yr period starting in April 1973. The percentage frequency of absences due to respiratory diseases was the highest at 13.0% (as compared to 10.7 in 1972), followed by a frequency due to gastrointestinal diseases of 2.6 (as compared to 2.1 in 1972). In every month and in every district, the percentage of absences due to respiratory diseases was the highest, except in some districts during June and July. The frequency of absences due to respiratory diseases as highest in older cities (18.3%), followed by that of the most polluted industrial district (16.6%), the coastal industrial zone (15.4%) and the rural districts (14.7%). No relationship between the frequency of absence due to respiratory diseases and air pollution, such as falling dust and sulfur dioxide, was observed. The increase of respiratory diseases in 1973 was probably due to influenza.

53158 **APTIC NO. 77359**

Bureau of Public Health, Amagasaki (Japan), Amagasaki Municipal Office

STATUS QUO OF PATIENTS OFFICIALLY RECOGNIZED TO SUFFER FROM ENVIRONMENTAL POLLUTION IN AMAGASAKI CITY. *(Amagasaki-shi kogaibyo nintei kanja no genkyo). Text in Japanese. 28p., 1973.*

The results of a questionnaire on the health of officially recognized patients under 15 yr old who suffer from pollution- related diseases are presented. The number of patients surveyed was 1771. The recovery of the questionnaires was 69.1%. The diseases included asthmatic bronchitis, bronchial asthma and chronic bronchitis. The occurrence of infantile asthmatic bronchitis and that of juvenile bronchial asthma increased. The time period between moving into the district and the onset of disease ranged from about a half-year to 1 yr. The percentage of improvement was 44.7%. The dependence of the diseases on weather was 71%, especially in cold weather, cloudy weather, and during seasonal transitions.

53159 **APTIC NO. 77361**

Bureau of Public Health and Environmental Pollution, Himeji (Japan), Himeji Municipal Office and Medical Assoc.

QUESTIONS AND ANSWERS TO CHILDREN AND THEIR PARENTS ON SUBJECTIVE SYMPTOMS. *(Jido oyobi fukei o taisho to suru anketo chosa). Text in Japanese. In: Report of Survey on the Influence of Air Pollution on Health, p. 84-102, 1973.*

Himeji City was divided into 4 districts, and children and their parents were questioned about their subjective symptoms. Their answers were collected and processed by BMRC method. The answers given by children and their respective parents did not agree. However, subjective symptoms of asthma increased from the preceding year. The total number of persons having subjective symptoms showed no consistent trend in the coastal industrial district, in the older city, in polluted districts, and in rural district. The disease history was noticeable for asthma, pertussis, and conjunctivitis, with no difference of frequency among districts, except rural district. Generally, a small increase of subjective symptoms over 1972 was observed, with no difference among districts, except for the rural district.

53160 **APTIC NO. 77362**

Bureau of Public Health and Environmental Pollution, Himeji (Japan), Himeji Municipal Office and Medical Society

RESULTS OF SURVEY ON THE MORBIDITY OF SPECIFIED DISEASES OF INHABITANTS IN HIMEJI CITY BY MEMBERS OF THE SOCIETY AS MONITORS. *(Honkai kaiin o monitar to suru honshi jumin no tokutei shikkan yushoritsu chosa). Text in Japanese. In: Report of Survey on the Influence of Air Pollution on Health, p. 31-51, 1973.*

A year-long survey of chronic bronchitis, asthma-like bronchitis, asthma, and lung cancer in 235,928 patients conducted starting in April 1973, by the members of the medical society of Himeji. The area surveyed consisted of one coastal industrial zone, a city center with commerce and residential areas, and two agricultural zones. Morbidity rates of chronic bronchitis were high in the agricultural zone, and those of asthma-like bronchitis and asthma were noticeably high in the coastal industrial zone. The incidence of chronic bronchitis was high in field workers; that of asthma-like bronchitis was high in infants; and that of asthma was high in field workers as well as in students and pupils, as was seen in 1972. Chronic bronchitis occurred in aged persons, especially those in their sixties. The occurrence of asthma-like bronchitis and asthma was frequent in infants, became less frequent with age, and became more frequent among people over 50. Lung cancer occurred mainly among persons over 50, equally distributed between the sexes. These findings were generally the same as those obtained in the past 4 yr.

53161 **APTIC NO. 77417**

Study Group of the Survey of Environmental Pollution

REPORT OF SURVEY ON THE EFFECT OF AIR POLLUTION ON CITIZENS OF KOBE CITY, 1973. PART II. INVESTIGATION OF RESPIRATORY RESISTANCE OF SCHOOLCHILDREN. *(Kobeshi ni okeru taikiosen to shimin no kenkochosa ni tsuite - Dai-nikai gakudo kokyuteiko chosa). Text in Japanese. 38p., 1973. 6 refs.*

The respiratory resistance and health of 1588 pupils (male: 826, female: 762) in the sixth year class were examined and 347 pupils (male: 178, female: 169) in the fifth year class of 12 and 3 primary schools, respectively, in Kobe city in June-July 1973. The total average of respiratory resistance and body height ranged, respectively, from 5.0-5.5 cm H2O/l/sec and 141.5-144.9 cm. The respiratory resistance value obtained in 1973 was a little lower than that obtained in 1972, with a smaller number of respiratory complaints. No significant correlation between respiratory resistance and the air pollution among the pupils was found when they were classified by school, with one exception.

1972

53162 **APTIC NO. 76906**

Chin, Shin Ton, S. Yamaoka, O. Fukase, M. Fukuda, and M. Oka

ANIMAL EXPOSURE EXPERIMENTS BY POLLUTED URBAN ATMOSPHERE PART 2. HISTOLOGICAL FINDINGS ON THE TRACHEA AND THEE LUNG. *(Toshi-osen- taiki ni yoru dobutsu bakuro jikken. Part 2. Kikan, Hai no Soshiki Shoken ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):195, Nov. 1972.*

Male white mice of the SD-JCL strain in the 4th week after birth were respectively reared (A) in heavily polluted atmosphere, (B) in moderately polluted atmosphere, and (C) in clean air for about 100 days, and their trachea and lungs were histologically examined. The findings were: the group C showed almost normal; in the A group, proliferation, ablation, accentuation of mucous secretion, and infiltration of inflammatory cells by lymphocytes in the tracheal mucous epithelium were conspicuously observed as well as denaturated ablation of bronchial and bronchiolar epithelium, and dust cells in bronchial cavities, alveolar cavities, and on alveolar walls; the findings in the B group were quite similar to those in the group A; and in both groups A and B, the development of lymphatic apparatus was better than in C. In short, those animals reared in polluted air showed chronic bronchitis and chronic tracheitis, the difference of air pollution not making a large difference in the pathological change.

53163 **APTIC NO. 76903**

Homma, K.

SEDIMENTATION RATE OF HEAVY METAL AEROSOL IN THE LUNG. *(Jukinzoku aerosol no hai-nai chinchaku-ritsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):198, Nov. 1972.*

After devising an apparatus by which aerosols comprising several heavy metals with any particle diameter of small dispersion and good stability can be obtained, Sprague-Dawley male rats (9 wk old) were exposed respectively to lead and tellurium aerosol prepared by the apparatus for 90 min. Just after the exposure the animals were anesthetized, and their lung and trachea were removed and calcined to be analyzed for lead and tellurium by atomic spectrophotometry. By assuming a constant volume of respiration, it was found that the sedimentation aerosol particle in the lung decreased as the particle diameter increased in both the cases of lead and tellurium. However, the intrapulmonal sedimentation could not be controlled only by the effect of inertia.

53164 **APTIC NO. 76912**

Imai, N., K. Abe, K. Komuro, and M. Oda

ON THE CHANGE OF INHABITANTS CONSCIOUSNESS ON AIR POLLUTION. *(Taikiosen ni tsuite no jumin ishiki no henka). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):318, Nov. 1972.*

The consciousness of inhabitants in Isogo Ward, Yokohama City about air pollution was surveyed in 1969 and 1973. A group of industrial factories was partly in operation in 1969 but was in full operation by 1973. Fortunately there was very slight difference in sex ratio, age, occupation, health condition, and smoking habits of the objects between 1969 and 1973. The survey was performed by questionnaires consisting of 43 items. The percentage of positive answer to human impairments in 1969 and 1973 were: 38.7 and 34.2 experience of health damage; 8.1 and 5.4 of eye-irritation; 16.1 and 14.5 of throat-irritation; 5.8 and 13.6 of sneeze; 4.2 and 2.3 of snivel; 9.2 and 10.2 of cough; 3.6 and 17.1 of dyspnea; 5.4 and 7.4 of asthma; and 22.2 and 5.7 of odor. Generally, the largest source of air pollution in this area was auto exhaust followed by factory-exhaust, and the change of inhabitants consciousness about air pollution pointed out the situation. Most inhabitants were pessimistic about the future status of air pollution in the surveys in 1969 and also in 1973.

53165 **APTIC NO. 76916**

Kanzaki, A., T. Meguro, and K. Mukada

OUTLINE OF THE HEALTH EXAMINATION OF INHABITANTS IN OKAYAMA PREFECTURE. *(Okayama-ken ni okeru jumin-kenko chosa no gaikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):212, Nov. 1972.*

In 5 areas in Okayama Prefecture, epidemiological, clinical, and physician-entrusted examinations were carried out on the respiratory diseases possibly due to air pollution. The items of examination were Fletcher s inquiries, CMI conscientiousness survey, history taking, body height determination, urinalysis, blood pressure determination, internal medical examination, ECG (electrocardiogram), lung function examination, roentgenography, and conjunctivitis by disease, age, and area. The objects were total inhabitants with ages between 40-69 in the epidemiological survey, 20% of women extracted from total women with age between 40-69 in the clinical survey, and total inhabitants in the physician-entrusted survey. The findings were: (1) the frequency of complaints concerning respiratory symptoms was highest in Mizushima, followed by Okayama; (2) obstructive and combined type lung function was highest in Okayama followed by Mizushima, and in short, complaints and abnormality of lung function were more numerous in the Mizushima area.

53166 **APTIC NO. 76904**

Kusumoto, S., Y. Tsubota, E. Yonekawa, T. Nakajima, and M. Kubo

CHANGE OF LEUCOCYTE AND ALKALINE PHOSPHATASE OF MOUSE EXPOSED RESPECTIVELY TO OZONE AND PHOTOCHEMICAL OXIDANT. *(Ozon oyobi kokagaku okishidanto boro mausu no hakkekyu narabini arukarihosufatze no hendo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):197, 1972.*

To study the effect of smog on the increase of WBC (white blood cells) and the ratio of neutrocytes to lymphycytes and the change of serum alkaline phosphatase activity of heavily impaired patients, the following animal exposure experiment was carried out. Male mice (ICR-JCL) were exposed to artificially prepared photochemical oxidant. The findings were: (1) after 5, 15 and 25 hr of the exposure to oxidant containing ozone at 3 + or - 0.5 ppm for 3-3.5 hr, RBC (red blood cells) increased from just after exposure during 5 hr and returned to normal; (2) WBC began to increase 15 hr after the exposure;

(3) some cases of increase of the ratio neutrocyte to lymphocyte were seen after 5 hr of exposure, however no correlation was found to individual WBC; (4) in the mice exposed to oxidant at 0.1-0.5 ppm, 2-3 hr/day, 5 days/wk, for 3 consecutive mo, a decrease of RBC was recognized and the ratio of neutrocyte to lymphocyte increased; and (5) there was decrease of alkaline phosphatase activity just after the exposure, however, after 5 hr no difference was observed between that of control. Effects of continued exposure to oxidant depending on sex, and changes of serum and lung alkaline phosphatase (which is activated by magnesium) were also reported.

53167 **APTIC NO. 76899**

Mishima, M., M. Hitosugi, K. Ishikawa, and T. Suzuki

SURVEY OF LEAD AND CO-HB IN INHABITANTS IN GENERAL. *(Ippan-jumin no ketsuchi namari oyobi CO-Hb no chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):204, Nov. 1972.*

To grasp the effects of air pollution on the human body in smaller cities, lead content and CO-Hb (carboxyhemoglobin) in blood were examined in inhabitants of Soka City, Saitama Prefecture, as well as the factors of living. The inhabitants are non-uniform as an occupational population, however, from the point of view that the work places are located in the same city they are considered to be uniform as an occupational population. In the city, the Pb content of air was 6, 2-5 and 1 microgram/cu m, respectively, in highly, moderately, and slightly polluted areas. The Pb content of blood of inhabitants in highly polluted areas in the city was on the arithmetical average - 15 micrograms/dl, and CO-Hb in the same individuals was 1.8% (2.6% in smokers and 1.2% in nonsmokers). These figures means that the effect of air pollution was very slight in the inhabitants in this city.

53168 **APTIC NO. 76900**

Mizoguchi, I., K. Makino, Y. Sato, S. Osawa, M. Chikusa, and H. Noushi

ON THE FACTORS OF EYE-IRRITATION IN THE CASES OF PHOTOCHEMICAL SMOG. *(Kokagaku smog ni okeru gan-shigekisayo no inshi ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):202, Nov. 1972.*

Experiments were carried out for elucidating the factors of eye- irritation in cases of photochemical smog by exposing human volunteers in a chamber containing auto exhaust illuminated by ultraviolet irradiation while determining oxidant. hydrocarbon, peroxyacetyl nitrate temperature, relative humidity, and nitrogen oxides. By combining the abovementioned factors of which all volunteers felt the irritation, it was found that a combination of several factors caused the eye-irritation. For instance, at a temperature of 30 C, relative humidity of 50%, with oxidant concentration of 0.39 ppm and hydrocarbon concentration of 10 ppm, about 70% of the volunteers felt an irritating sensation in the eyes.

53169 **APTIC NO. 76905**

Nakamura, S., Y. Nakayama, and T. Miura

EFFECTS OF AUTO EXHAUST AND PHOTOCHEMICAL OXIDANT ON LIVING BODIES. *(Jidosha haikigas oyobi kokagaku oxidant no seitai ni oyobosu eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):196, Nov. 1972.*

Ninety male mice (ICR-JCL) 3 wk after birth were divided into 3 groups, A, B and C, and animals of A group were exposed to auto exhaust containing carbon monoxide at 40-60 ppm, animals of the B group were exposed to artificial oxidant at total oxidant of 0.1-0.6 ppm for 2 hr/day, 4 days/wk, for 9 wks, and animals of C group were kept as controls. No difference was observed in the growth-time curves of the 3 groups of animals. The findings on leukocytes were: after 4 days exposure to auto exhaust WBC (white blood cells) were reduced to about 4000/cu mm as compared to 5000-6000/cu mm of control, however, 3 days after the suspension of exposure the WBC count was restored to normal; the exposure to oxidant gave almost the same change of WBC; the composition of leukocytes showed no remarkable change by exposure to auto exhaust, but changes were seen in group B such that the lymphocyte ratio was reduced and the neutrocyte ratio increased; and when radioactive colloidal gold in water was inhaled for 10 min after 9 wk of exposure, the intake of foreign matter increased in auto exhaust-exposed animals and the excretion rate decreased. In another experiment in which 4 groups of the male mice were exposed respectively to oxidant and auto exhaust 2 hr/day for 5 days the number of macrophages increased in animals exposed to oxidant and to auto exhaust, especially conspicuously in animals exposed to auto exhaust.

53170 **APTIC NO. 76897**

Nobutomo, K., Y. Kodama, E. Kunitake, R. Urabe, and S. Ishinishi

INVESTIGATION OF LUNG FUNCTION ON INHABITANTS IN FUKUOKA AND OMUTA CITIES. *(Fukuoka-shi oyobi Omuta-shi ni okeru haikini ni kansuru chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), (2):210, Nov. 1972.*

The results of examination on the methods of evaluation of lung function were described in the case of examination of lung function of inhabitants in Fukuoka and Omuta Cities using indices such as FEV obs (forced expiratory volume), FEB prod, % FEV, FEV 1.0, FEB 1.0%, PER, MBC obs, MBC prod, and % MBC. Even by obtaining the cooperation of the objectives and by standardizing the sex, the age, and the body height no conspicuous difference in lung function between the inhabitants in the two cities was found.

53171 **APTIC NO. 76898**

Rokushika, T. and M. Aoyama

RELATIONSHP BETWEEN COMPLAINTS AND PHYSIQUE AND PHYSICAL STRENGTH OF SCHOOLCHILDREN CONCERNING AIR POLLUTION. *(Taikiosen ni yoru jido-seito no shuso to taikaku, tairyoku to no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):209, Nov. 1972.*

According to the questionnaires and answers on complaints of 25,537 schoolchildren in 42 schools of Nagoya City, 4 primary and 3 middle schools were appointed as air polluted, and 4 primary and 2 middle schools were appointed as non air-polluted, and the children therein were examined as to physical conditions (body height, body weight, and girth of the chest) and sports function. Another survey was carried out on the relationship between the complaint frequency on several symptoms and lung function and development in polluted, slightly polluted, and non-polluted schools. The finding were: the frequency of complaints concerning air pollution was higher in polluted schools than in non-polluted schools; there was no difference in physique and physical strength between children in polluted and non-polluted schools except for ability to run for a long time in middle school; and those who complained more frequently in polluted schools showed a lower motion index in going up and down a footstool.

53172 **APTIC NO. 76913**

Takenaka, K., M. Tsuda, T. Okumura, H. Yamaguchi, and Y. Tsunetoshi

RESULTS OF HEALTH EXAMINATION OF INHABITANTS AROUND A GASEOUS FORMALDEHYDE-EXHAUSTING FACTORY. *(Formarin-haishutsu kojo shuhen no jumin kenko chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):218, Nov. 1972.*

Because of the complaints of eye-irritation and pain in throat possibly due to formaldehyde from the inhabitants around a plastics factory manufacturing urea resin and its products, health examinations were carried out from Sept. to Nov. 1971. The examination consisted of questionnaires and clinical examination. The frequency of complaints of inhabitants who stay home in daytime of eye-ache, pain in throat, and sensation of dryness was significantly higher in those who live nearer to the factory, however, the frequency of complaints from inhabitants of school age on ophthalmological and otorhinolaryngeal symptoms was inversely proportional to the distance from the factory. According to clinical examination, conjunctivitis and conjunctival hyperemia were frequently found, and chronic rhinitis, chronic pharyngitis and laryngitis were the major findings. The health of inhabitants around the factory was impaired by exhausted substance from the factory.

53173 **APTIC NO. 76902**

Tsunoda, F., E. Aizawa, S. Sakurai, H. Kunita, and K. Sasaki

ON THE BODY POLLUTION OF INHABITANTS IN ENVIRONMENTALLY POLLUTED AREAS BY FLUORIDES IN AIR. *(Taikichi fukkabutsu ni yoru kankyoosen chiku jimin no seitaiosen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):199, Nov. 1972.*

According to the urinalysis of 13 male and 17 female inhabitants living in an area environmentally polluted by fluorine from whom more than 1 liter of urine in a day were obtained, the average content of fluorine was 2.02 mg (S.D. of 0.30 mg) and 1.77 mg (S.D. of 0.43 mg), respectively. The data obtained on the urinalysis of 9 male and 13 female inhabitants living in an area not polluted by fluorine was 0.79 mg (S.D. of 0.07 mg) and 0.73 mg (S.D. of 0.07 mg). The above difference of fluorine in urea is due to the difference of the amount of fluorine on agricultural products on which fluoride in air is deposited. The average fluorine content of urine of peoples who showed spotted teeth due to excessive intake of fluoride was 1.20 (S.D. of 0.12) mg (19 males 20 - 49 yr old), 1.50 (S.D. of 0.2) mg (10 males 50-69 yr old), 1.20 (S.D. of 0.12) mg (17 females 20-49 yr old) and 1.13 (S.D. of 0.08) mg (15 females 50-69 yr old). Considering the fact that orally taken fluorine was excreted more than 50% within 12 hr, urinalysis of fluorine was a very effective indicator of fluorine pollution.

53174 **APTIC NO. 76915**

Yamaga, M., K. Omori, T. Tozawa, and K. Abe

EXAMINATION OF LEAD CONTENT IN SCHOOLCHILDREN S TEETH. *(Gakudo no shigachu namariryo no kento). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):214, 1972.*

The results of examination on the relationship between air pollution by lead in auto exhaust and lead content of teeth of schoolchildren living in highly polluted, moderately polluted, and non-polluted areas in Kanagawa Prefecture in 1968 are reported. The specimens were milk teeth which have fallen out and teeth in caries which were pulled out. The 177 specimens were brushed well, washed with distilled water and dried to be wet-calcined. Because of no difference of lead content between boys and girls teeth, the examination was carried on combined specimens. The findings were: (1) lead content was significantly higher in teeth of children in heavily and moderatley polluted areas than in those in non-polluted area; (2) the lead content by area and by age showed lower values in older children in highly and non-polluted areas. In general, the lead content of teeth was higher in children living in more polluted areas suggesting the effect of environmental pollution.

53175 **APTIC NO. 76914**

Yoshida, A., H. Motomiya, M. Adachi, M. Matsumura, and K. Ito

RESULT OF EXAMINATION ON RESPIRATORY FUNCTION OF SCHOOLCHILDREN IN FUJI CITY. *(Fujishi no gakudo no kokyu kino kensa). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):216, Nov. 1972.*

The respiratory function of schoolchildren in 4 primary schools in Fuji City was traced monthly from Oct. 1960 to Oct. 1961 (except Aug. 1961). Sulfur oxide concentration in the nearest representative points in the city during the period was, on the average, 0.055, 0.048, 0.036 and 0.02 ppm. Although the results of tracing did not give the clear conclusion that the vital capacity of the children was smaller and its increase with body height becomes worse as the air pollution by sulfur dioxide increases, it is considered that the adaptation of lung function to the environment is considerable, and the increases of vital capacity in the area where air pollution is fairly low was not good.

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53176 **APTIC NO. 76800**

Baba, T. and S. Sakai

PHYSIOLOGICAL STUDIES ON THE MECHANISM OF DAMAGE OCCURRENCE ON CROPS BY AIR POLLUTION. PART 1. EFFECTS OF SOIL MOISTURE ON THE DAMAGE OF CROPS DUE TO SULFUR DIOXIDE. *(Sakumotsu no taikiosen higai no hassei-kiko ni kansuru seiriteki kenkyu. Dai 1-po. Dojo-suibun ga sakumotsu no aryusan gasu higai ni oyobosu eikyo). Text in Japanese. Nogaku Kenkyu (Rep. Ohara Inst. Agric. Biol.), 55(2):87-96, March 1975. 27 refs.*

In order to investigate the relationship between soil moisture and crop damage due to sulfur dioxide, sand-cultured crops such as turnip, barley, and rice plant wer exposed to SO2 at about 20 ppm for 2-4 hr under an illumination of 8000 lux at different soil moistures (100, 80, 60, and 40%) in a glass house. Regardless of the plant species, the crop damage represented by damaged leaf area was most serious at a soil moisture of 80%. The stomatal aperture was also largest at a soil moisture of 80%. Stomatal aperature paralleled the amount of water evaportaion per unit area of leaf. Regardless of the species and soil moisture, the pH of the sap of leaf tissue decreased after exposure to SO2. A close relationship was observed between the leaf damage due to SO2, stomatal aperture, the pH of the sap of leaf tissue.

53177 **APTIC NO. 77312**

Baba, T. and S. Sakai

PHYSIOLOGICAL STUDIES ON THE MECHANISM OF CROP DAMAGE DUE TO AIR POLLUTION PART III. ON THE EVOLUTION OF ETHYLENE FROM PLANTS BY SULFUR DIOXIDE TREATMENT. *(Sakumotsu no taikiosen no hassei kiko ni kansuru seiriteki kenkyu Dai 3-po Aryusan gasu shori ni yoru ethylene no hassei ni tsuite). Text in Japanese. Nihon Sakumutsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), vol. 44:83-84, 1975.*

Potted plants such as Chinese cabbage, wheat, and barley were placed in a growth cabinet filled with sulfur dioxide concentrations of 1.7 and 0.5 ppm, respectively at 25 C, relative humidity of 65-75% under an illumination of 40,000 lux for 1.5-2 hr. The ethylene evolved was determined by gas chromatography. The results showed that as the concentration of SO2 increased and the leaf-damage became more severe, the amount of ethylene evolved was larger. Because plant damage by SO2 was manifested in untimely defoliation, a reduction in leaf number and shortening of tree height, and because these symptoms appeared after ethylene treatment, the so-called damage caused by SO2 exposure would have contained the damage by ethylene evolved from the plants exposed to SO2. The leaf-damage of wheat, which is resistant to SO2, was less than that of barley, which is susceptible to SO2.

53178 **APTIC NO. 77313**

Baba, T. and S. Sakai

PHYSIOLOGICAL STUDIES ON THE MECHANISM OF CROP DAMAGE DUE TO AIR POLLUTION PART 2. ON THE DIFFERENCE OF DAMAGES DUE TO SULFUR DIOXIDE IN CASES WHERE NUTRITION CONDITIONS AND VARIETY WERE CHANGED.

(Sakumotsu no taikiosen no hassei kiko no kansuru seiriteki kenkyu Dai 2-ho. Eiyojoken oyobi hinshu o kotoni seru baai no aryusan gasu ni yoru higai no sai ni tsuite). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), vol. 44:81-82, 1975.

Wheat and rice which had been water-cultured under the same nutritive conditions and were placed from the middle stage of growth under standard (N), half of standard (N), two times of standard (N), minus P and minus K conditions, respectively, were exposed to sulfur dioxide during the sprouting period of wheat and just after the heading of rice. The Eh6 and pH of leaf tissue sap were lowered after the exposure of both plants and were restored after 24 hr. There was a parallel between the aperture of the stomata before exposure (A) the percentage of damaged leaf, and between the Eh6 before exposure (B) and the percentage of damaged leaf area. There was a close relationship between the percentage of damaged leaf and Eh after exposure and to the ratio A/B, suggesting that the high value of Eh6 and smaller aperture of the stomata before exposure decreased the amount of damage. Peroxidase activity in the leaves varied with Eh6, suggesting a relationship to sulfur dioxide oxidation. Norin No. 37 rice which was resistant to root rot and had a higher Eh6 showed a smaller decrease of Eh6 and less sulfur dioxide damage than Norin No. 22 rice, which was susceptible to root rot and had a lower Eh6.

53179 **APTIC NO. 77345**

Fritz, Walter and Rudolf Engst

MORE RECENT RESULTS ON THE CONTAMINATION OF FOOD BY CARCINOGENIC HYDROCARBONS CAUSED BY ENVIRONMENTAL POLLUTION.

(Neuere Ergebnisse zur umweltbedingten Kontamination von Lebensmitteln mit krebserregenden Kohlenwasserstoffen). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. 10:148-172, 1975. 48 refs.

In order to determine the sources and the extent of food contamination caused by carcinogenic hydrocarbons, soil samples, vegetables, and fruit from regions close to and far from industrial areas, as well as from the immediate vicinity of emission sources, were analyzed. The content of 3,4-benzopyrene from soil far from an industrial area increased from an average of 15 (0.8 to 60) to an average of 440 to 500 microgram/kg (100 to 1100) in regions close to an industrial area. A significantly higher content of 3,4-benzopyrene, between 3000 and 1,500,000 micrograms/kg, was found close to emission sources. Vegetables from industrial areas were more contaminated by 3,4-benzopyrene, by as many as 10 times, depending on the distance from the emission source. After the installation of filters in a soot factory, the content of 3,4-benzopyrene in crops was reduced by 40 to 70% after only one vegetation period.

53180 **APTIC NO. 76796**

Hatta, Haruko and Kazuya Terakado

INJURIES OF MORNING GLORY DUE TO PHOTOCHEMICAL OXIDANT AND ITS PROPERTIES AS AN INDICATOR PLANT. PART 1. CHARACTERISTICS OF OXIDANT INJURIES ON MORNING GLORY, AND RELATIONSHIP BETWEEN DAMAGE INDEX AND CUMULATIVE OXIDANT VALUES.

(Oxidant ni yoru asagao no higai to sono shihyosei ni tsuite. Dai 1-po. Asagao no oxidant higai no tokucho oyobi higaishisu to oxidant ruisekichi no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(4):722-728, Feb. 1975. 5 refs.

In contrast to the absence of leaf damage to morning glory (Scarlet O Hara) plants grown in a filtered glass room, injuries such as chlorosis and necrosis were observed on leaves of the same variety grown in a non-filtered glass room. The injuries were caused mainly by ozone. A high correlation existed between the leaf damage index of morning glory and the cumulative value of oxidant. Damage at the end of August appeared when the cumulative value of oxidant was over 49 pphm (1-hour average over 8 pphm), or 44 pphm (1-hour average over 9 pphm), or 43 pphm (1-hour average over 10 pphm). Damage in the middle of September appeared when the cumulative value was over 72, 79, or 52 pphm for the above 1-hour averages, suggesting a difference in susceptibility depending on the growth stage. There was also a correlation between the total area of damage leaves (from the top to the fifth) and the cumulated oxidant value, with the correlation being nearly identical to that obtained when all leaves were examined. Morning glories of the Scarlet O Hara variety appear to be effective plant indicators of photochemical oxidant pollution, especially since they develop one to two leaves a day, thus making daily observations during smog episodes possible.

53181 **APTIC NO. 76829**

Haut, Hans van

SHORT-TERM EXPERIMENTS FOR DETERMINATION OF THE RELATIVE PHYTOTOXICITY OF NITROGEN DIOXIDE.

(Kurzzeitversuche zur Ermittlung der relativen Phytotoxizitaet von Stickstoff-dioxid). Text in German. Staub Reinhaltung Luft, 35(5):187-193, 1975. 28 refs.

In short-term experiments, the relative phytotoxicity of nitrogen dioxide was determined for 60 types of plants by comparing it with that of sulfur dioxide. The plants, which included crop and garden plants such as alfalfa, clover, barley, lettuce, carrots, parsley, radishes, onions, beans, and tobacco; ornamental plants, such as roses, dahlias, and gladioli; and coniferous and deciduous trees, such as pines, spruces, birches, and maples, were exposed to the two gases in paralell experiments. The exposure concentrations were 5 to 20 mg NO2 cu/m air and 1.5 to 4 mg SO2/cu m air. Taking the average concentration ratio of SO2 to NO2 of 1/3.5 and an SO2 long-term value of 0.1 mg SO2/cu m, an average value of 0.35 mg NO2/cu m of air was obtained for the vegetation half-year. The average value obtained for a 30-min period was 0.80 mg NO2/cu m of air.

53182 **APTIC NO. 76768**

Lopata, Wolf-Dieter and Hermann Ullrich

STUDIES CONCERNING SUBSTANTIAL AND STRUCTURAL CHANGES IN PLANTS UNDER THE INFLUENCE OF NO2.

(Untersuchungen zu stofflichen und strukturellen Veraenderungen an Pflanzen unter NO2-Ein fluss). Text in German. Staub, Reinhaltung Luft, 35(5):196-200, May 1975. 10 refs.

For determination of the influence of nitrogen dioxide on respiration and photosynthesis, the oxygen and carbon dioxide production in string beans (phaseolus vulgaris) was determined by the Warburg method. It was found that fumigation with NO2 had a more deleterious effect on photosynthesis than to respiration, causing the chloroplasts and mitochondria to invaginate more frequently, and produced tubular protrusions on the outer layer of the invaginations. After treatment with NO2, dense layers of filaments appeared in the stroma. Nitrogen dioxide treatment caused specific changes in the leaf pigments, thus offering a possibility for specific NO2 diagnosis. The uptake of NO2 was found to be proportional to the amount of water lost and, hence dependent on the stomatal width. The pigment damage was not linearly proportional to the amount of NO2 taken in by the plants. Plant substances such as ascorbic acid and dioxyphenylalanin influenced pigment damage. Ectodesmata could not be found. Stomatal reactions of various plants were influenced differently.

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53183 **APTIC NO. 77377**

Mankovska, Blanka

INFLUENCE OF FLUORINE IMMISSIONS FROM AN ALUMINIUM FACTORY PLANT ON ITS CONTENT IN DIFFERENT DEVELOPMENTAL STAGES OF EUROPEAN PINE SHOOT MOTH RHYACIONIA BUOLIANA DEN. ET SCHIFF. (LEPIDOPTERA). *(Vplyv imisii fluoru z hlinikarne na jeho obsah v roznych vyvojovych stadiach obalovaca mladnikoveno rhyacionia buoliana den. et schiff. (lepidoptera). Text in Czech. Biologia, 30(5):355-360, 1975. 16 refs.*

The fluorine content of different developmental stages of the European pine shoot moth Rhyacionia buoliana Den. et Schiff. (Lepidoptera) was examined in relation to fluorine emissions from an aluminum factory in the area. Differences in fluorine content of the moth for control regions versus the region under investigation were statistically significant at the 95% level of significance. The highest fluorine levels were found in dead larvae (465 mg/100 g). Dead pupae showed a level of 152.9-192.5 mg/100 g. Significant fluorine levels were also found in internal parasites, amounting to 68.2-97.6 mg/100 g.

53184 **APTIC NO. 77478**

Matsunaka, Shoichi

USE AND PROBLEMS IN THE USE OF INDEX PLANTS FOR THE MONITORING OF ATMOSPHERIC POLLUTION. *(Taiki osen kanshi o mokuteki to shita shihyo shokubutsu no riyo to mondaiten). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo (Japan), p.85-86, 1975. (Presented at Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

The use of index plants for monitoring pollution includes the use of naturally growing plants and the artificial placement of plants. Each of these methods has its own merits and demerits. An example of the former is the investigation by the Ministry of Agriculture on the state of growth of keyaki, Zelkova serrata, in the Kanto Plain. The effect of environmental pollution was clearly noticed in the state of growth of the tree, which is one of the most popular big trees in the Plain. In the direction east and west of Tokyo, the effect of pollution is hardly noticed at a distance farther than 60 km. However, in the north and northwest directions, the effect is noticed for more than 100 km. For artificial placement of plants, mosses and morning glories are suited. Morning glories were grown at 140 junior high schools all over Japan and it was found that the observation of the growth state of the plant is helpful for the judgement of the atmospheric pollution. In the Netherlands, various plants are being used for the monitoring of atmospheric pollution. The plants are solumum tuberosum for ozone and ethylene, Beta vulgaris for sulfur dioxide, and Sinapis alba for nitrogen dioxide and peroxyacetyl nitrate.

53185 **APTIC NO. 77310**

Matsuoka, Y.

ON THE ROLE OF STOMA IN THE ABSORPTION OF SULFUR DIOXIDE. *(Aryusan gasu kyushu ni okeru kiko no yakuwari ni tsuite). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop. Sci. Soc. Japan), vol. 44:89-90, 1975.*

A rice plant of the variety Koshikikari was exposed to sulfur dioxide at 1 ppm in an artificially illuminated metabolism chamber for 5 hr at 30 C and 50,000 lux under the following conditions: (A) none, (B) air flow without carbon dioxide, (C) air flow with 3000 ppm CO2, (D) sprayed with 0.0001 mole of PMA, and (E) air flow without carbon dioxide or oxygen. After 24 hr of exposure, the sulfur content of the uppermost leaf was measured to determine the amount of absorbed sulfur dioxide. The amount of absorbed sulfur dioxide decreased in cases of C, D, E, B, and A (in that order). The aperture of the stoma decreased in the order C, D, B, A, and E. The correlation coefficient both cases was 0.821. However, in E, severe damage appeared on the leaves. In case E, however, the coefficient was 0.951. According to the results of BB and C, photosynthesis was not related to the absorption of SO2. The correlation of illumination to photosynthesis, and that of temperature and photosynthesis to absorption of SO2 were due to the dependency of stomatal aperture on temperature. The major factor in controlling SO2 absorption was the stomatal aperture.

53186 **APTIC NO. 77330**

Matsuoka, Y., H. Yoda, S. Omichi, and K. Shiratori

A FILTERED AIR PLASTIC CHAMBER AS AN EXPERIMENTAL FACILITY TO PROVE VISIBLE DAMAGE OF CROPS DUE TO AIR POLLUTION. *(Nosakubutsu taikiosen no jikkensochi to shite shisakushita Filtered Air Chamber ni tsuite). Text in Japanese. Chiba-ken Nogyo Shikenjo Kenkyu Hokoku (Bull. Chiba-Ken Agr. Exp. Sta.), no. 16:87-92, 1975. 7 refs.*

An experimental filtered air chamber was constructed to prove the visible damage of crops due to air pollution. The chamber was provided with another room into which non-filtered ambient air was introduced. The purified air was prepared by filtering ambient air with activated carbon. The average content of air pollutants in the purified air chamber was less than 10-20% of the ozone and 20% of the sulfur oxides in the ambient air. However, cultivated vegetables such as tobacco and spinach, which are susceptible to oxidant, showed no visible damage in the filtered air chamber, and showed the same damage in the non- filtered air chamber as was seen in fields at the same time.

53187 **APTIC NO. 77496**

Matsuoka, Y., T. Takasaki, M. Morikawa, T. Matsumaru, K. Shiratori, S. Omichi, and H. Yoda

THE PROCESS OF BROWNING OF LEAVES OF COLOCASIA ANTIQUORUM AND THE ELUCIDATION OF THE CAUSE - ESPECIALLY ON THE RELATIONSHIP TO PHOTOCHEMICAL OXIDANT. *(Satoimo yo no kappen shojo no hasseikeika to sono genin kaimei -tokuni kokagaku oxidant to no kankei ni tsuite). Text in Japanese. Chiba-ken Nogyo Shikenjo Kenkyu Hokoku (Bull. Chiba-ken Agr. Exp. Sta.), no. 16:93-102, 1975. 21 refs.*

The appearance of browning on the leaves of varieties of Colocasia antiquorum in August, September, and October in Chiba Prefecture in 1969 was caused by photochemical oxidants. Colocasia grown in a purified air chamber on activated carbon filter did not show any leaf-browning. Of 6 kinds of air pollutants, the causal agent was oxidant. Colocasia grown in a non-purified air chamber showed the same symptoms as those on Ca. grown in fields, which appeared on the second day of exposure to high concentrations of photochemical oxidant. The damage was proportional to the concentration of oxidant. According to the symptoms on tobacco leaves of (Bel-W3) used as an indicator plant, the cause was photochemical oxidant. The symptoms appeared on the tobacco leaves on the same day as symptoms appeared on C.a. The severest browning appeared on the second and third leaves from the top without affecting the newest leaf on the lowest leaf, a phenomenon which is characteristic of photochemical oxidant. According to histological observation of the damaged leaf, necrosis of palisade parenchymatous cells was confirmed. Upon exposure of C.a. to 0.3 ppm of ozone for 3 hr, chlorotic spots appeared on the inner parts of the leaves.

53188 **APTIC NO. 77545**

Runeckes, V. C. and H. M. Resh

THE ASSESSMENT OF CHRONIC OZONE INJURY TO LEAVES BY REFLECTANCE SPECTROPHOTOMETRY. *Atmos. Environ., 9(4):447-452, April 1975. 13 refs.*

The use of reflectance spectrophotometry to determine the effects chronic ozone exposure (0.05 ppm daily for 6 hr) and infection with rust fungus on bean plants is described. The diffuse nature of chronic injury precluded accurate visual assessment, but measurements of spectral reflectance of the upper leaf surface yield precise and reproducible differences as a result of O3 treatment. Chlorophyll estimation following extraction lacks adequate precision. The usefulness of reflectance measurements is discussed in the light of the symptomatology of chronic injury and senescence of the affected leaves. Such measurements are minimally affected by rust infection. (Author abstract modified)

53189 **APTIC NO. 77340**

Shinozaki, M., M. Maeno, and Y. Mizusawa

EFFECT OF PIPERONYLBUTOXIDE ON OZONE INJURY TO SPINACH. *(Horenso no ozon shogai ni taisuru piperonylbutoxide no koka ni tsuite). Text in Japanese. Kanagawa-ken Nogyo Sogo Kenkyu-sho Kenkyu Hokoku (Bull. Agr. Res. Inst. Kanagawa Prefect.), no. 115:45-52, Jan. 1975.*

The effect of piperonylbutoxide on ozone damage to spinach was studied to determine a countermeasure. The spinach planted in pots was grown in an ozone-free pure air chamber. One group was exposed to ozone once for 3 hr at 20 pphm, and the other group was exposed twice at intervals of 5 days under the same conditions. An aqueous 0.1% solution of piperonylbutoxide was sprayed twice on the spinach, 5 days and one day before ozone exposure. The effect of K and N fertilizers was also examined in relation to piperonylbutoxide treatment. The ozone damage of pre-treated plants by piperonylbutoxide was very slight, while that of non-treated plants was severe. The ozone damage to a plant exposed twice was more severe than to one exposed once. However, the damage to pre-treated plant was the same as to one exposed once. The conditions of fertilization showed no effect on ozone damage. Ozone-exposure accelerated the growth of spinach with increased crop-yield.

53190 **APTIC NO. 77311**

Takasaki, T., Y. Matsuoka, M. Morikawa, T. Matsumaru, and K. Shiratori

STUDIES ON THE EFFECTS OF AN AIR POLLUTED ENVIRONMENT ON THE GROWTH AND YIELD OF CROPS. PART 1. ANALYSIS OF RICE PLANT GROWTH BY FILTERED AIR-CHAMBER METHOD. *(Taikiosen kankyo ga nasakubutso no seiiku shuryo ni oyobosu eikyo ni kasunru kenkyu). (Dai 1-po Filtered air chamber ho ni yoru suito no seicho kaiseki). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), vol. 44:87-88, 1975.*

Rice plants of variety Koshikikari were grown in two glass chambers. Purified air was forcibly introduced into one of them, and natural air containing 2.4 - 4.6 pphm of oxidant, 1.3 - 1.6 pphm of sulfur oxides, 1.7 - 2.0 pphm of nitrogen dioxide and 0.71 - 0.79 pphm of hydrocarbons into the other. The temperature difference between outdoor and indoor was 2 - 4 C in good weather. Although no difference of plant height and number of stems was observed on rice plants in the two chambers, the dry weight of the plants in the pure air chamber was greater after the middle stage of growth. Although the rate of leaf-growth, earing stage, and influorescent stage were the same in both chambers, a tendency toward repressed aging was observed in the plants in the pure air chamber. The increase in dry plant weight was due to that of ear weight. The effect of purified air was to inhibit the decrease of photosynthesis after the later growth stage and of the translocation function.

53191 **APTIC NO. 77502**

Tomiya, K., S. Tanida, K. Aonuma, and M. Takahashi

THE EFFECTS OF SULFATE ION IN RAIN WATER ON TREES. ON THE RESPONSE OF TREES SPRAYED WITH VERY DILUTE SULFURIC ACID, PART 1. *(Usuichi no ryusan-kon ga jumoku ni oyobosu eikyo, ryusansui (hanahada teinodo no kiryusan) sanpu ni yoru jumoku no hanno ni tsuite (1)). Text in Japanese. Preprint, Japan Forestry Society, Tokyo (Japan), p. 447-448, 1975. 4 refs. (Presented at the Japan Forestry Society Annual Meeting, 86th, Kyushu, Japan, April 2-3, 1975.)*

In rainwater collected at 1 and 2 mm, a high concentration of sulfate ion (more than 1000 ppm) was recorded in Goi, Chiba Prefecture. A series of experiments was carried out in 1973 in which dilute sulfuric acid at 1000, 500, 250, and 0 ppm was sprinkled evenly on Cryptomeria japonica, Chamaecyparis obtusa, Pinus thunbergii, P. densiflora, Zelkova serrata, Ligustrum lucidium, Pasania edulis, Forsythia koreana and a species of poplar. In 1974, the same experiment was performed on P.d., Z.s., and L.l. (once every few days at 1 l/sq m. Visible damage appeared sooner at higher concentrations. The same degree of damage did not develop when the concentration was lower. The symptoms resembled those due to sulfur dioxide damage. On P.t., no damage was observed. At the concentrations in the present experiment no total withering was observed. Noticeable symptoms on the leaves were: reddish-browning from the apex P.d., peripheral browning to total deformation of P.e., dark purple spots on L.l., irregular reddish-brown spots spreading from the apex Z.s., brown-to-black discoloration of F.k., and reddish-brown to greyish-brown discoloration developing into a whitish-grey network in a species of poplar.

53192 **APTIC NO. 77503**

Tomiya, K., S. Tanida, K. Aonuma, M. Takahashi, A. Kawana, and M. Doi

THE EFFECTS OF SULFATE ION IN RAIN WATER ON TREES. ON THE RESPONSE OF TREES SPRAYED WITH VERY DILUTE SULFURIC ACID, PART 2. *(Usui-chu no ryusan-kon ga jumoku ni oyobosu eikyo, ryusansui (hanahada teinodo no kiryusan) sanpu ni yoru jumoku no hanno ni tsuite (2)). Text in Japanese. Preprint, Japan Forestry Society, Tokyo (Japan), p. 449-451, 1975. 2 refs. (Presented at the Japan Forestry Society Annual Meeting, 86th, Kyushu, Japan, April 2-3, 1975.)*

The contents of sulfur, chlorophyll, and moisture in leaves, trunks, and roots were determined in trees sprinkled with dilute sulfuric acid once every few days. The sulfur content of the leaves was generally increased with the concentration of sulfuric acid in the water. This tendency was more noticeable in broadleaf trees than in conifers. The sulfur content of the inner part of trunks and roots showed no definite tendency. In the leaves of Pinus densiflora, the chlorophyll content decreased as concentration of sulfuric acid increased. However, this tendency was not observed in the leaves of Ligustrum lucidium. In the leaves of Zelkova serrata, there was a decrease of moisture content, and a very slight decrease in P.d. and L.l. There was a decrease in the number of chloroplasts in leaves sprinkled at 1000 ppm, with withering of spongy tissue and palisade parenchyma. The resistance of trees to sulfuric rainfall was as follows (in decreasing order): Cryptomeria, Chamaecyparis, P. thunbergii, P. densiflora, Pasania, Ligustrum, Zelkova, Forsythia, and a species of poplar. Although no withering was observed, the amount of leaf-fall indicates that exposure to longer periods of acidic rainfall would result in the inhibition of tree growth.

53193 **APTIC NO. 76830**

Zahn, Richard

GASSING EXPERIMENTS WITH NO2 IN SMALL GREENHOUSES. *(Begasungsversuche mit NO2 in Kleingewaechshaeusern). Text in German. Staub, Reinhaltung Luft, 35(5):194-196, 1975. 6 refs.*

The tolerance limits of plants to nitrogen dioxide are 2 to 8 times higher than to sulfur dioxide. Gassing for two to three hrs at a concentration of about 5 mg NO2/cu m was tolerated even by sensitive plants. Intermittent exposure to NO2 was less harmful than continuous gassing. Gassing over a period of weeks at a concentration of 2 to 4 mg NO2/cu m resulted in reductions in yield as high as 37%. Visible damages, such as necrosis or chlorosis, may be absent. The safe limit for the most sensitive plants is 0.5 to 0.8 mg NO2/cu m. When subjected to exposure for short periods, plants are more sensitive at night than during the day. Proper nourishment increases the resistance of plants to NO2 exposure.

53194 **APTIC NO. 77295**

Kanagawa Prefecture (Japan), Bureau of Environmental Protection

ON THE RESULTS OF INVESTIGATION ON THE MECHANISM OF OCCURRENCE OF PHOTOCHEMICAL INJURIES USING MORNING GLORY AS PLANT INDICATOR. *(Asagao o shikyo to suru kokagaku kogai no hassei kiko ni tsuite). Text in Japanese. In: Status Quo and Countermeasures of Photochemical Smog: p. 91-93, 1975.*

Morning glories of the Scarlet O Hara variety were grown in many high schools in the Kanagawa Prefecture, and their damage was observed from June 1 to July 31 in 1974 to observe the effect of photochemical smog. Although the weather conditions were unseasonable, and sufficient results could not be obtained, the damage to morning glories by photochemical smog occurred throughout the prefecture, and a relationship was found between the amount of damage and the oxidant concentration in the air. At more than 11-12 pphm of daily maximum concentration of oxidant and at more than 70 pphm/hr of oxidant dose, the percentage of injury attained 70-80%. In the Yokosuka and Miura areas, where a high oxidant concentration appeared frequently, there was less damage, while in the western part of the prefecture, where a high oxidant was in frequent, the damage occurred frequently. The Scarlet O Hara variety seemed to be too susceptible to photochemical smog for use as a plant indicator.

53195 **APTIC NO. 77495**

Kawasaki Municipal Bureau of Environmental Protection (Japan)

ON THE RESULTS OF INVESTIGATION ON INJURIES OF MORNING GLORY BY PHOTOCHEMICAL SMOG IN KAWASAKI CITY. *(Kawasaki shinai ni okeru kokagaku smog ni yoru asagao higai chosa kekka ni tsuite). Text in Japanese. In: Status Quo and Countermeasures of Injuries Due to Photochemical Smog: p. 93-96, 1975.*

The total metropolitan area of Kawasaki was sectioned into 35 squares of 2 km a side, and at a point in each square 3 morning glory plants (variety: Scarlet O Hara) were planted. Damage to them was observed from June 18 to September 9, 1974. The relative damage of morning glory was more severe in northwestern parts of the city (a residential zone) than in coastal industrial zones. The injuries were concentrated in the week when photochemical smog alerts were issued 5 times/wk. However, the relationship between the injury and oxidant concentration was not clear. However, numerical evaluation of the relationship between the degree of damage to morning glories and the oxidant concentration (neglecting several conditions) was attempted.

53196 **APTIC NO. 77504**

Yokohama Municipal Bureau of Tree Planting (Japan)

ON THE RESULTS OF INVESTIGATION ON THE EFFECTS OF PHOTOCHEMICAL SMOG ON TREES. *(Kokagaku smog ni yoru shokubutsu eikyo chosa kekka ni tsuite). Text in Japanese. In: Status Quo and Countermeasures of Injuries Due to Photochemical Smog: p. 97-98, 1975.*

The susceptibility, suitability as a plant indicator, and the distribution of injuries of vegetables such as spinach, Colocasia antiquorum, a salting green, Japanese radish, and turnip to photochemical smog were investigated in fields throughout Yokohama in 1974. Of the 387 individual vegetables investigated, the number of damaged vegetables was was 47. The percentage of damage of each vegetable was 12.0% spinach, 11.5% of C.a., 8.3% of the salting green, and 3.4% of Japanese radish. The damage was less than those in 1972 and 1973. The (percentage) reduction in harvest was 2.5-5.7% of spinach, 1.0-1.3% of the salting green, 1.6-2.3% of smaller turnip and 1.7-2.1% of the total harvest of the 3 species.

1974

53197 **APTIC NO. 77308**

Haneda, M.

AN ACCOMMODATION EXPERIMENT IN FIELDS OF SMOKE-RESISTANT TREES PART VII (B) ON EXPERIMENTAL TREE PLANT IN FIELDS. *(Taiensei jumoku no genchi tekio shiken VII. (b) Ryokkaju genchi shokusai shiken). Text in Japanese. Okayama-ken Ringyo Shikenjo Hokoku (Bull. Okayama Prefect. For. Exp. Stn.), no. 14:25-26, Dec. 1974.*

In a park in Kurashiki City 10 trees from each of the Viburnum awabuki, Zelkova serrata, Myrica rubbra, Liquidamar formosana, Nerium indicum, Cryptomeria japonica, Hibiscus syriacus, Chamaecyparis obtusa and Sapium sebiferum species were planted in February 1972, with fertilization of every 5 trees. Their leaves were collected in August and November 1973 for sulfur analysis, and their growth states were surveyed in March 1974. The sulfur content showed considerable inter-species difference. It was higher in H.s., V.a. and N.i., moderate in S.s. and C.o., and lower in L.f. in August. It was higher in H.s. and V.a. and moderate in C.o., N.i. and S.s. in November. The species which showed higher sulfur content in leaves than in the same species planted a non-polluted area in August were H.s., C.o., L.f., and S.s. The relationship between the sulfur content of leaves and fertilization was not clear. The growth per year indicated by the increase in height was 9.9 cm in H.s., 9.2 cm in S.s., 7.7 cm in Z.s., 6.4 cm in C.o., and 1.0 cm in L.f., the total height being 176-276 cm.

53198 **APTIC NO. 77314**

Haneda, M., K. Harada, and E. Inoue

STUDIES ON THE INFLUENCE OF AIR POLLUTION ON TREES AND ON THE CULTIVATION OF TREES FOR SHADE PART III. *(Taikiosen no jumoku ni oyobosu eikyo narabini ryokka jumoku ikusei ni kansuru kenkyu). Text in Japanese. Okayama-ken Ringyo Shikenjo Hokoku (Bull. Okayama Prefect. For. Exp. Stn.), no. 14:116-151, Dec. 1974.*

In 10 monitoring spots set every 2.5 km to 10 km from an air pollution source, and every 5 km to 30 km from the source in a northeastern direction. In 3 areas in a northern direction, the atmospheric concentration of sulfur oxides, the sulfur content of the needles, and the condition of Pinus densiflora grown there were determined. In another study, shade trees were planted in polluted areas to study their growth and the sulfur content of their needles. The atmospheric average sulfur oxides content from April 1973 to March 1974 was dependent on the distance from the source of pollution to the monitoring point (0.46-0.06 mg SO3/day/100 sq km). The average yearly sulfur content of the needles was 0.18[illegible] dry base). It increased as the distance from the pollution source decreased. It was generally larger in the two-year old needles. There was a significant positive correlation between atmospheric sulfur oxide content and the sulfur content of the needles, with a correlation coefficient of 0.5855 in the [illegible]-old leaves and 0.5472 in the two-year old leaves. Even after several analyses it was not possible to determine the effect of air pollution on growth. As the elapsed time since the planting of the shade trees was short, no effects of air pollution were found. However, species specificity of the sulfur content of the trees was recognized.

53199 **APTIC NO. 77329**

Hiratsuka, Tokuyuki, Kazuo Tohi, and Masahiro Ito

INVESTIGATION OF THE EFFECTS OF AIR POLLUTANTS ON CROPS AND PLANTS. *(Taiki osen busshitsu ga engei sakumotsu to ni oyobosu eikyo shiken). Text in Japanese. Kanagawa-ken Sangyo Senta Shiken Kenkyu Hokoku (Ann. Rep. Kanagawa Prefect. Sericult. Cent.), no. 2:74-90, July 1974.*

An investigation carried out at 19 locations in 4 districts of the Kanagawa Prefecture during 30 dayss in December 1970 is discussed. Dust concentration, including soluble and insoluble substances, was measured with a dust jar. Other pollutants were trapped by alkaline filter paper and determined by barium chlorinilate (SOx), Saltzman (NO2), mercuric chloranilate (Cl ion), and ion electrode (F ion). The sulfur and fluoride contents, as well as the metal contents of mulberry leaves were analyzed in May, August, and November. The average S and F contents in leaves collected in August were 1435 ppm and 11.57 ppm, respectively. Potted mulberry plants were exposed to ozone and sulfur dioxide and O3, at low concentrations for 6 hr a day for 2 days. The S content in leaves exposed only to O3 was the same as that in control leaves, while the leaves exposed to SO2 + O3 contained more S, indicating a synergistic effect of the mixture.

53200 **APTIC NO. 77304**

Imai, S. and S. Sato

DEMONSTRATION OF IODINE POISONING IN SILKWORMS BY USING ARTIFICIAL DIETS. *(Jinkoshiryo ni yoru yosochudoku kaiko no shomei). Text in Japanese. Preprint, Japan Society Air Pollution, Tokyo, Japan, 9(2):399, 1974. (Presented at the Japan Society of Air Pollution, Annual Meeting, 15th, Fukushima, Japan, Oct. 1974.)*

In order to examine the cause of silkworm disease in the Mobara area, Chiba Prefecture, possibly due to the ingestion of iodine- polluted mulberry leaves, fourth instar worms were fed diets containing 0, 50, 150, 200, 250, 300, 350, and 400 ppm iodine. As the iodine content increased, the specific symptoms became more severe, the number of worms not able to make normal cocoons increased, and the number of deaths increased. Intoxication caused browning of the body, whitening of internodal integument, swelling of internodal parts, the appearance of oily spots on the integument, the formation of large skin defects and blackening around the spiracles in fourth instar worms.

53201 **APTIC NO. 77539**

Kamata, K. and S. Sato

IODINE POLLUTION OF MULBERRY LEAVES AND ITS EFFECT ON SILKWORMS. *(Kuwaba no yosoosen to kaiko eno eikyo). Text in Japanese. Preprint, Japan Society Air Pollution, Tokyo, Japan, 2(9):398, 1974. (Presented at the Japan Society of Air Pollution, Annual Meeting, 15th Fukushima, Japan, Oct. 1974.)*

In order to assess the damage to silkworms, due possibly to polluted mulberry leaves, the mulberry leaves in fields 300 m to the southwest and 1000 m to the south of an iodine factory in Mobara, Chiba Prefecture were collected every 15 days from April to September and analyzed for iodine. Furthermore, the leaves were examined biologically by feeding them to silkworms. The iodine content of the leaves increased as a function of leaves grown on days of 25 to 130 ppm iodine. There was a positive correlation between the degree of leaf pollution and the reciprocal of the distance from the factory to mulberry field. Iodine pollution increased to the south and southeast, especially in late fall, causing growth damage to the silkworms. The content of iodine in mulberry capable of death was estimated at about 70 ppm.

53202 **APTIC NO. 77309**

Kimoto, K. and S. Hirayama

AN ACCOMMODATION EXPERIMENT IN FIELDS OF SMOKE-RESISTANT TREES PART VII (A) EXPERIMENT OF FIELD PLANTING OF TREES OF PINUS GENUS. *(Taiensei jumoku no genchi tekio shiken VII. Matsu zoku genchi shokusai shiken). Text in Japanese. Okayama-ken Ringyo Shikenjo Hokoku (Bull. Okayama Prefect. For. Exp. Stn.), no. 14:21-25, Dec. 1974.*

In an experimental planting field in Kurashiki City, the following pine trees were planted in February 1968, in fertilized and non-fertilized plots: 38 Pinus densiflora, 39 P. thumbergii, 33 P. teda, 38 P. liquida, 38 P. slash and 27 P. densiflora formosana. The growth state, damage due to pests and the effects of air pollution of these trees were investigated by evaluating the sulfur content, the color and number of needles, as well as the monthly concentration of sulfur oxides in the atmosphere. In 1973 the growth of trees was best in P. slash followed by P. teda and P. thumbergii, P. densiflora, and P. liquida. P. densiflora formosana did not grow normally. The sulfur content of dry leaves of the trees listed in the above order in 1973 in the fertilized plot was 0.244, 0.198, 0.259, 0.262, 0.182, and 0.242%. In P. densiflora, the content of sulfur was greater in trees of abnormal appearance. The atmospheric sulfur oxides content was, on the average, 0.48 and 0.50 ppm respectively in 1972 and 1973.

53203 **APTIC NO. 77335**

Maeno, M.

THE LOCAL EVALUATION OF AIR POLLUTION BY BIOLOGICAL INDICATORS. *(Seibutsu shihyo ni yoru taiki osen no chiiki hyoka ni kansuru chosa kenkyu). Text in Japanese. Kanagawa-ken Nogyo Sogo Kenkyujo Gyomu Nenpo (Ann. Rep. Kanagawa Prefect. Agr. Integr. Inst.), 1973:79, June 1974.*

The activity of five species of trees in 16 places including public gardens, greens, shrines, and temples in Kanagawa Prefecture was determined, and infrared color photographs taken by a multiband camera from the air were analyzed for photographic density. Air pollutant concentrations were determined at pollution monitoring stations located in the prefecture. There was a close correlation between the activity of the trees and the state of air pollution, and there was a positive significant correlation between the photographic density of the trees and the activity of the trees selected as biological indicators.

53204 **APTIC NO. 77360**

Nakajima, I.

REMOTE SENSING AND A METHOD OF DETERMINING GREENNESS. *(Rimoto senshingu to midori no chosa hoho). Text in Japanese. Doboku Gakkai-shi (J. Japan. Soc. Civil Engrs.), 59(10):33-35, Sept. 1974, 1 ref.*

A survey was conducted to determine the constitution of electromagnetic waves reflected from the surface of the earth. The quantity and distribution on the earth's surface was characterized by the observation of near-infrared light, the naked soil was characterized by that of orange light (0.6-0.7 micrometer), and artificial constructions were characterized by that of green light (0.5-0.6 micrometer). Therefore, the record of soil surface as determined by wavelength showed the degree of natural preservation or damage of plants by several factors, including air pollution. A separate investigation of plant growth by the naked eye corroborated these results. The decrease in plant vigor was indicated by the decrease of near-infrared light and the increase of visible light.

53205 **APTIC NO. 77390**

Nakao, M., T. Kimura, and K. Saito

SURVEY OF AIR POLLUTION DUE TO FLUORINE COMPOUNDS, PART II. ON CROP DAMAGE AROUND A TILE FACTORY. *(Fusso kagobutsu ni yoru taikiosen ni kansuru chosa, Sono 2, Kawara kojo shuhen* *ni okeru nosakubutsu higai ni tsuite). Text in Japanese. Shimane-ken Eisei Kogai Kenkyusho Nenpo (Annu. Rep. Shimane Prefect. Inst. Public Health Control Environ. Pollut. Inst.), no. 15, 1974.*

Damage to pine trees, fruit trees, and agricultural crops has been reported since 1972. The areas of damage include forests, paddy field, and upland fields. Plant specimens, soil, clay, and glaze materials were analyzed primarily for fluorine. In rice grown near the factory there was a very high fluorine concentration (130 ppm) in the leaves (13 6. ppm in controls), a high fluorine content carrot tops (27.5 ppm), and in the edible part of Welsh onions (68.0 ppm). Samples of clay and glaze materials for tile contained 161-216 and 51-141 ppm of fluorine respectively. Although the fluorine content of clay and glaze material was not high, the plant damage was due to the exhaust gas from the tunnel-type high temperature furnace of the tile maker, which contained about 20.0 mg fluorine/cu m.

53206 **APTIC NO. 77338**

Saeki, M.

AIR POLLUTION AND LICHENS. *(Taiki osen to lichen). Text in Japanese. Igaku no Ayumi (Progr. Med.), 90(8):429-430, Aug. 24, 1974. 4 refs.*

An investigation of the growth of lichens such as Parmelia reticulata, P. tinctorum, P. caperata, P. clavulifera, P. leucotyliza, and Anaptychia microphylla on old tombstones near Sendai City is described. The tombstone-lichen index was assumed to be the area (sq cm) of the first four species of lichens on 15-yr old tombstones divided by the number of tombstones. The distribution of the indices coincided well with the equi-concentration curves of sulfur dioxide in the air. The lichens began to be affected by SO_2 at 0.012-0.014 ppm (yearly average, 1 hr value) and stopped growing at 0.016-0.018 ppm. As lichens are capable of detecting complex air pollution and are readily available, they would be good air pollution indicators.

53207 **APTIC NO. 76838**

Shinohara, Hisashi, Issei Nakamori, and Kenjiro Takeshita

THE EFFECTS OF AIR POLLUTANTS ON PLANTS. *(Taiki osen busshitsu no shokubutsu ni oyobosu eikyo). Text in Japanese. In: Survey and Research Report on Medical Examination Method of Pollution-caused Health Damages, Kyushu Environmental Management Assoc., Fukuoka (Japan), p. 107-110, 1974 (?).*

The effects of air pollutants, including sulfur oxides, fluorides, chlorine, and chlorides, on plants are reviewed. Leaves of rice plants develop white spots and gradually lose their green color when exposed to SO_2. Leaves of tomato plants develop brown spots although the tomato fruit usually is not injured. The SO_2 threshold concentration for rice and wheat plants is about 200 ppm/hr, whereas that for tomato and strawberry plants is 25 ppm/hr. Other plants which are easily injured by SO_2 include cotton, lettuce, sweet potato, and carrot. Fluorides cause damage to plants at ppb levels. Plants which are easily injured by fluorides include peach, corn, sweet potato, and grape. Chlorides cause plant damage to a greater extent than does SO_2. Radish is injured by chloride concentrations of 1.3 ppm (30 min).

53208 **APTIC NO. 77392**

Tokyo Metropolitan Agricultural Experiment Station (Japan)

RESULTS OF THE INVESTIGATION ON THE EFFECTS OF PHOTOCHEMICAL SMOG UTILIZING SOFT AND WEAK VEGETABLES AS INDICATORS. *(Nanjaku yasai-rui shihyo to shita kogakagu sumoggu eikyo chosa). Text in Japanese. 8p., July 1974.*

During a period of very high oxidant concentration on May 18, 1974, the damage to soft vegetables grown at 49 locations in the Tokyo metropolitan area was investigated. The damage to their leaves on May 21-24 were classified as severe (injured area of leaves more than 30%), moderate (less than 30%, but more than 10%) and light (less than 10%). The damage was classified into ozone- type and peroxyacetyl nitrate-type. Ozone-type was characterized by destruction of plant tissue, bleached spots on the upper surface of the leaves, or brown spots produced by the formation of anthocyanin. The PAN-type was characterized by the destruction of spongy parenchyma, and the silvering or bronzing of the lower surface of the leaves. Ozone damage was severe in spinach, Chinese cabbage, radishes, and shallots, while damage by PAN was severe in spinach, Swiss chard, and lettuce. Ozone damage was localized in three wards east of the Sumida river and the center of San-tama area. The damage due to PAN was located mainly in northern areas.

53209 **APTIC NO. 77505**

Kanto Regional Headquarters for Promoting Environmental Protection (Japan), Section of Air Pollution

REPORT OF THE INVESTIGATION OF THE EFFECTS OF PHOTOCHEMICAL SMOG ON PLANTS IN 1974. *(Kokagaku smog ni yoru shokubutsu eikyo chosa hokokusho, 1974). Text in Japanese. 80p., March 1975.*

The results of investigations of plant damage (mainly vegetables and cereals) by photochemical smog in the Kanto district in July and August 1974 are reported. The investigations were done 2 days after two continuous days of photochemical smog with high oxidant concentration are described. The investigation was carried out at 78 locations on 24 species of plant. The species on which damage was observed were Colocasia antiqualum, maize, Welsh onion, peanut, soybean, spinach, Chinese cabbage, Beta vulgaris, turnip, Japanese radish, morning glory, radishes, carrots, a salting green, sesame, petunia, tobacco, and rice plants (lowland and upland varieties). From the symptoms (chlorisis and necrosis), damage due to ozone and peroxylacetyl nitrate (PAN) was observed. The damage occurred throughout the district. The distribution of damage, susceptibility by month and by species the occurrence of photochemical smog by time and by concentration, and the meteorological conditions are described.

1973

53210 **APTIC NO. 77325**

Hiratsuka, T. and K. Tohi

INVESTIGATION OF THE INFLUENCE OF AIR POLLUTANTS ON HORTICULTURAL CROPS AND OTHER PLANTS. *(Taiki osen busshitsu ga engei sakumotsu to ni oyobosu eikyo shiken). Text in Japanese. Kanagawa-ken Sangyo Senta Shiken Kenkyu Hokoku (Ann. Rep. Kanagawa Prefect. Sericult. Cent.), no. 1:124-139, Aug. 1973.*

The degree of air pollution was measured at four monitoring points in the prefecture by dust jar (dust-fall) and alkaline filter paper to determine the monthly total amounts of insoluble matter, soluble matter, sulfur oxides, nitrogen dioxide, and chloride ion. The leaves of mulberry trees were collected at the four monitoring points in May, August, and November, and the sulfur and fluorine contents were determined. In August, leaves were collected from locations within the four monitoring areas and the levels of iron, zinc, lead, copper, cadmium, and nickel were also determined. Morever, an experiment was carried out in a greenhouse where mulberry seedlings were exposed to ozone at 0.2 ppm, and to a mixture of ozone and sulfur dioxide. With some variation, the insoluble matter was larger in August, and generally ranged from 2-5 tons/sq km/30 days. Soluble matter ranged from 1-4 tons/sq km/ 30 days with some variation of area and month. NO_2 and SO_3 trapped on alkaline filter paper was less than 0.08, 0.02-0.13, 0.01-0.015, and less than 0.15 mg/100 sq cm/day (NO_2), and 0.07-0.35, 0.10-0.45, 0.15-0.65, and 0.11-0.35 mg SO_3/100 sq cm/ day. Chloride showed relatively small variations. There was little variation of S, F, Zn, Pb, and Cd in the leaves. The exposure experiment on ozone for 12 days (7 hr/day) showed a negative result on the leaves without any symptoms. However, although no damage was observed just after exposure to a mixture of ozone at 0.2 ppm and SO2 at 2 ppm for 4 hr, brown spots appeared between the veins with a little larger sulfur content than the control, after 3-4 days exposure.

53211 **APTIC NO. 77540**

Minagawa, K., H. Sakai, M. Yokoyama, and Y. Takizawa

STUDIES ON THE ENVIRONMENTAL POLLUTION BY POLYCHLOROTERPHENYL. *(PTC no kankyoosen ni kansuru kenkyu). Text in Japanese. In: Abstract of Niigata Prefecture Research Institutes for Public Health and Pollution, 1973, p. 16-17, 1973.*

After finding a difference in the environment' behaviors of polychlorinated terphenyl (PCT) and polychlorinated biphenyl (PCB) 400 specimens of beef, pork, ham, sausage, chicken meat, fish, rice, fish-eating birds, insect- and amphibian-eating birds, cereals- and aquatic-animal eating birds, and birds which eat mixed food, were examined for PCT content. The PCT was detected in 5 out of 10 chicken meat specimens (an average of 0.02 ppm with a maximum of 0.1 ppm (fat base), and in only one specimen of pork, at 0.01 ppm. No PCT was detected in other foods, especially in 60 specimens of fish and shellfish, suggesting another pattern from that of PCB. In birds, PCT was detected only in birds eating mixed food (2.2 ppm in the crow liver). A content of 61.5% PCT was detected in a fly-back transformer which uses PCT in an open-air system. After administering PCT once to rabbits, peros and subcutaneously, it was found that a high chlorine content and high-boiling fractions of PCT tended to remain in the body.

53212 **APTIC NO. 77333**

Miyake, Y., Y. Uno, M. Aoki, and H. Oguma

ON THE INJURY OF TOBACCO LEAVES BY SO2. *(Tobako-ha no aryusan gasu shogai ni tsuite). Text in Japanese. Preprint, Society of Science of Soil and Manure, Japan, no. 19:47-147, Sept. 1973. (Presented at the Society of Science of Soil and Manure, Lecture Meeting, 1973.)*

In an investigation of the effect of sulfur dioxide and ozone on tobacco leaves, potted tobacco seedlings of the variety MC-1610 (yellow cultivar) and of the variety Bel W3, which is highly susceptible to ozone, were exposed to 0.14 ppm and 0.30 ppm of SO2 for 50 days in vinyl greenhouses to observe their growth and the appearance of signs of disease. After harvesting, their organs were analyzed. The leaves of the plants exposed to higher concentrations of SO2 showed chlorosis after about the 20th day of exposure and the appearance of a redish brown color was observed on the leaf margins. At harvesting, the decrease in dry weight of stalks and leaves, and the repressed growth of stalk- diameter and of the largest leaf were recognized in the MC variety. In the leaves of the plant exposed to 0.3 ppm of SO2, there was an accumulation of sulfur. The potassium and raw ash contents increased in proportion to the concentration of SO2. However, the content of phosphoric acid, nitrogen, calcium, magnesium, and manganese was seen between the exposed plants and the controls. The ratio of iron manganese content and pH of the leaf decreased.

53213 **APTIC NO. 77334**

Miyake, Y. and Y. Uno

ON THE PHYSIOLOGICAL DISTURBANCE OF TOBACCO PLANTS APPEARING AS SPOTS ON THE LEAVES: PART IV. THE RELATIONSHIP BETWEEN THE SUSCEPTIBILITY TO OZONE AND ASCORBIC ACID AND GLUTATHIONE. *(Tabako no seiri hanten shogai ni tsuite -day 4 po- tabako-ha no ozon kannosei no soi to asukorubinsan, gurutachion tono kanren). Text in Japanese. Preprint, Society of Science of Soil and Manure, Mito, Japan, p. 59, Oct. 12, 1973. 2 refs. (Presented at the Society of Science of Soil and Manure, Lecture Meeting, 1973.)*

In order to determine the degree of physiological disturbance of tobacco leaves by ozone, with respect to glutathione and ascorbic acid contents of the plants, two kinds of tobacco plants, one of which (Bel W3-S) is highly susceptible to ozone, and the other of which (Bel W3-R) is resistant to ozone, were grown in a greenhouse and their leaves were collected 40, 60, and 80 days after transplantation, in the order of attachment to the stalks. The Bel W3-S plants showed some inferiority in plant height, the same dried leaf weight, and a slight inferiority of leaf yield to plants in Bel W3-R group. The ascorbic acid content of the 16-18th leaves (from the lowest leaf) of the Bel W3-R strain was larger than that of the Bel W3-S, regardless of the date of leaf- picking. There was no large difference between the ratios of reduced type glutation to the total ascorbic acid content in both strains. The glutathione content of leaves was highest in the S-strain the earlier growth stage, whereas in the R-strain it was highest on the 80th day after transplantation. However, it was not due to the difference in ozone-susceptibility, judging from the ratio of the oxidized • the reduced type of glutathione.

53214 **APTIC NO. 77471**

Nobel, Park S. and Cheng-Teh Wang

OZONE INCREASES THE PERMEABILITY OF ISOLATED PEA CHLOROPLASTS. *Arch. Biochem. Biophys., vol. 157:388-394, Aug. 1973. 39 refs.*

The effect of short-term exposures of chloroplasts isolated from the leaves of pea plants (Pisum sativum) to high ozone concentrations was examined. The inhibitory effect of O3 on endogenous photophosphorylation was apparently related to an increased permeability of the chloroplast limiting membranes induced by O3 exposure. A 5-minute treatment with 50 ppm O3 reduced the reflection coefficient of meso-erythritol from 0.84-0.58 and that of glycerol from 0.26-0.03. These decreases in reflection coefficients indicated that O3 caused a marked increase in the permeability of the chloroplast limiting membranes which was possibly due to oxidation of membrane lipids. The decrease in the reflection coefficient of meso-erythritol was proportional both to O3 concentration (up to 30 ppm for 5 min) and to time (up to 5 min at 30 ppm). An extrapolation of these results to lower concentrations and longer times indicated that O3 injury is possible for a 2-hour exposure of plants to 0.03 ppm. (Author abstract modified)

53215 **APTIC NO. 77534**

Sugino, M. and K. Ashida

AIR POLLUTION AND URBAN VEGETATION-POLLEN PRODUCTION OF GOLDEN ROD. *(Taiki osen to Toshi eisei-Seitaka-awadachiso gunraku no kafun seisan). Text in Japanese. Kinki Daigaku Kogai Kenkyusho, Kenkyu Hokoku (Kinki Univ. Pollut. Res. Inst. Rep.), no. 1:181-191, June 1973. 13 refs.*

Air pollutants distribute abnormally in the environment, and the normal balance in the ecosystem thereby is destroyed, causing air room pollution. Goldenrod are abnormal in their reproduction and growth, and the pollenosis which they cause has become a major interest in recent years. The formation and distribution of their vegetation, the pattern, and the amount of pollen production were investigated. Air purification effects as well as air pollution effects were considered. Goldenrod is a good indicator of the disorder in urbanization and development in Japan. They usually over-multiply on artificially non- interference uncovered land. Although they grow quickly, it is too soon for them to be part of the harmonized ecosystem in Japan.

53216 **APTIC NO. 77305**

Musashino Municipal Office, Musashino (Japan), Section of Environmental Pollution and Traffic

RESULTS OF SURVEY ON DAMAGE OF PLANTS DUE TO AIR POLLUTION (3-2). *(Taikiosen ni yoru shokubutsu higai chosa 3-2). Text in Japanese. In: Environmental Pollution of Musashino City 1973, p. 78-80, 1973.*

Since 1972, the leaves of Pinus densiflora in 10 places in Musashino City and in 5 places along the Itsukaichi highway were analyzed. The ratio of in-leaf water soluble sulfur to in-leaf total sulfur in pine trees along the highway was higher in unhealthy trees than in healthy one. This coincides with a report that acutely absorbed sulfur appears in water-soluble form. No trend of the ratio of chlorophyll-a/chlorophyll-b was found. The ratio of the amount of chlorophyll to the sulfur content of the leaf showed some abnormality in unhealthy trees and in some trees along the highway.

53217 **APTIC NO. 77306**

Musashino Municipal Office, Musashino (Japan), Section of Environmental Pollution and Traffic

RESULTS OF SURVEY ON DAMAGE OF PLANTS DUE TO AIR POLLUTION (3-1). *(Taiki osen ni yoru shokubutsu higai chosa 3-1). Text in Japanese. In: Environmental Pollution of Musashino City 1973, p. 67-77, 1973.*

The effects of photochemical smog were investigated by observing the damage in two varieties of potted morning glory, Scarlet O Hara, and violet, planted in 10 representative places in Musashino City and Tokyo from June to August 1973. Rubber- cracking tests were done in the same places. The observation was carried out after 2-3 days of photochemical smog alert, and periodically once a week. A difference in susceptibility to oxidant was observed between two varieties of morning glory, Scarlet O Hara being more susceptible than violet. The present source of damage was an oxidant concentration of more than 0.15 ppm for more than 2 hr. Rubber-cracking phenomena did not vary by area throughout the experiment period. However, after a shorter period there was a clear difference, suggesting that photochemical smog covered a wide area, its degree being topological. Rubber-cracking phenomena coincided with oxidant concentration. Morning glories planted in wet places were apt to be damaged by oxidant, and the temperature change coincided with the percentage of damaged leaves.

1972

53218 **APTIC NO. 76910**

Hoshino, T.

ON THE ESTIMATION OF DAMAGE OF AGRICULTURAL CROPS FROM DISTRIBUTION OF SULFUR DIOXIDE CONCENTRATION. *(SO2 nodo-bumpu kara mita nosakubutsu no damage no suitei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):235, Nov. 1972.*

On the basis of maximum tolerable concentration of sulfur dioxide of 0.1 ppm to agricultural crops and of lethal concentration of sulfur dioxide of 0.018 ppm to bryophytes, the effect of sulfur dioxide on agricultural crops was estimated from the distribution of sulfur dioxide in Ube as follows: (1) the area in which the concentration of sulfur dioxide is larger than 0.018 ppm changes from 3 sq km to 27 sq km, with an average of 20 sq km, and in this area there are plants which will be lethally impaired; (2) the area in which the concentration of sulfur dioxide is larger than 0.1 ppm is very narrow and if any, it is located in city area, therefore, no damage will appear in agricultural crops; and (3) from these considerations it is estimated that the damage of agricultural crops in Ube will be very small, if any, and in the area of 20 sq km there would be a loss of ecological balance or the yield of crops may be increased if sulfur dioxide is absorbed as a nutrient.

53219 **APTIC NO. 76901**

Tsunoda, F., H. Kunida, Y. Sato, K. Sasaki, Y. Kawarada, I. Kimura, M. Murakami, H. Shioi, and T. Yoshida

A CASE OF AUTOPSY OF A BULL REARED UNDER AIR POLLUTION ENVIRONMENT BY FLUORIDE CONDITIONS FOR 30 MONTHS. *(Fukkabutsu ni yoru taikiosen-kankyoka no 30 kagetsu shiiku shita ushi no baiken-rei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution, 7(2):200, Nov. 1972.*

A bull with body weight of 530 kg which was reared for 30 mo in a place where the fluorine content of the air is about 1 ppb and the fluorine content of daily plant food is 40-60 ppm was autopsied, the examination just before autopsy showing no anemia and no abnormality being shown in WBC (white blood cells), electrolytes, enzymes, or function of liver and kidney. On pathohistological examination no abnormal finding was obtained on the heart, lung, trachea, brain, liver, kidney, adrenals, spleen, pancreas or lymphatic glands; there were slight hanges on teeth and bone tissue. The fluorine content of tissues and organs was clearly high only in hard tissues and relatively higher in urine and in serum. The present case was in the stage of chemical fluorosis or the higher stage of bone mottling.

EFFECTS-MATERIALS

1975

53220 **APTIC NO. 77481**

Hirai, Kunio, Mitsuo Tokuda, and Keiko Ikeda

THE EFFECTS OF ATMOSPHERIC POLLUTION ON THE DISCOLORATION OF DYED MATERIALS. IV. THE EFFECT OF DILUTE NITROGEN DIOXIDE GAS ON THE DISCOLORATION OF DYED CLOTH. *(Taiki osen ga senshokubutsu no hentaishoku ni oyobosu eikyo. IV. Teinodo nisanka-chisso gas ga senshokufu no hentaishoku no oyobosu eikyo). Text in Japanese. Preprint, Japan Society of Pharmacy, Tokyo, p. 110, 1975. (Presented at the Japan Society of Pharmacy, Annual Meeting, 95th, Nishinomiya, Japan, April 4-6, 1975.)*

An apparatus was developed for the production of dilute nitrogen dioxide gas. A gas of definite concentration was allowed to flow through a wind tunnel. Dyed silk cloth or acetate rayon cloth was placed in the wind tunnel. After the exposure of these cloths to a definite amount of NO2, the spectral reflectivity of the cloths was measured between 400 nm and 800 nm with a spectral photometer. The results were compared with those before the exposure. The measurements were made at a gas flow rate of 1.5 and 2.0 l/min. The temperature of the experimental layer was 20 C, and the humidity in the experimental layer was 27, 35, 40 55, 60, and 70%. The time of exposure was between 12 hr and 14 days. Although the cloths disolved rapidly in concentrated NO2, they did not discolor in dilute NO2. After a long exposure time weak discoloration was noticed. In dry gas, the discoloration barely occurred.

53221 **APTIC NO. 77383**

Miksic, Boris A.

SOME ASPECTS OF METAL PROTECTION BY VAPOUR PHASE INHIBITORS. *Anti Corros., 22(3):5-8, March 1975. 7 refs.*

The use of vapor phase inhibitors to reduce atmospheric corrosion of metallic structures is discussed. Vapor phase inhibitors obtain the same preventative effect as conventional methods by the simple introduction of the inhibitor device into the metal enclosure. Vapor phase inhibitors also provide positive protection under conditions where traditional coatings, wraps, and silica gel fail or cannot be used. Successful applications of vapor phase inhibitors include high humidity environments, marine environments with high salt concentrations, and industrial environments with sulfur dioxide levels ranging up to 0.15 wt%.

53222 **APTIC NO. 76836**

Patrie, J.

BEHAVIOR OF ANODIZED AND GALVANICALLY COATED SEMIiFINISHED ALUMINUM SHEETS FOR BUILDINGS IN INDUSTRIAL AND MARINE ATMOSPHERES. *(Tenue a l atmosphere industrielle et marine des semi-produits anodises et colores electrolytiquement destines au batiment). Text in French. Rev. Alum., no. 436:37-43, Jan. 1975. 6 refs.*

The effect of different types of surface treatment on aluminum plates exposed to marine and industrial atmospheres was studied. The aluminum plates were anodized in sulfuric acid to obtain an oxide layer of 16-18 micron thick, after which they were galvanized with copper, nickel, or different pigments. Copper-plated surfaces corroded in the industrial atmosphere, but not in the marine atmosphere. In general, copper-plating was susceptible to corrosion while nickel-plated surfaces were not attacked, even after prolonged exposure. Good agreement was established between prolonged exposure tests and accelerated exposure patterns.

1974

53223 **APTIC NO. 77445**

Boyd, W. K. and F. W. Fink

CORROSION OF METALS IN THE ATMOSPHERE. *Batelle Columbus Labs., Columbus, Ohio, Metals and Ceramics Information Center, Defense Supply Agency Contract DSA900-74-C-0616, Rept. MCIC-74-23, 77p., Aug. 1974. 120 refs.*

NTIS, DDC: AD-784-943

Industrial atmospheres are usually corrosive mainly because of the presence of sulfur products, particularly sulfur dioxide (SO2). The presence of SO2 results in a significant lowering of the critical relative humidity for corrosion. Sulfur products, in general, promote accelerated attack by combining with the moisture to form corrosive acids, namely sulfurous and sulfuric acids. Particulate matter such as residues from the combustion of fuels present in typical industrial atmospheres contributes to the corrosion activity on the surface. The main corrosion characteristics of the commercial metals commonly employed for external applications are summarized. Sections dealing with carbon, weathering, and stainless steels, aluminum alloys, copper base alloys, and zinc and zinc coated steel are included.

1972

53224 **APTIC NO. 77511**

Nagano, T., A. Hattori, T. Nagai, Y. Ukishima, I. Iwasaki, S. Ishikawa, and Y. Nakai

SURVEY ON THE METAL CORROSION BY AIR POLLUTION: EFFECTS OF SULFUR DIOXIDE ON METALS. *(Taiki osen ni yoru kinzoku fushoku chosa (Dai 1 po): Aryusan gasu no kinzoku ni oyobosu eikyo). Text in Japanese. Shizuoka-ken Eisei Kenkyusho Nenpo (Annu. Rep. Shizuoka Pub. H.), no. 16:203-216, 1972. 7 refs.*

Experiments were conducted on the effect of sulfur dioxide on the corrosion of copper, aluminum, and iron. Copper and plates (2 by 5 by 0.2 cm) and iron plates (2 by 5 by 0.4 cm) were pre-treated by refluxing in petroleum ether for 4 hr. The Cu plates were washed with 50% sulfuric acid, water and 1% alcohol and weighed after drying at 105-110 C. The Al plates were washed with 91% alcohol and weighed after drying, while the iron plates were washed with 5% hydrochloric acid, H2O and 91% alcohol and weighed after drying. The metal plates were fixed to supporters and hung in a tin-plate cylindrical cover. After exposure to SO2, the plates were treated in refluxing petroleum ether for 4 hr. The Cu and Al plates were dried and weighed while the iron plates were treated with 10% ammonium citrate, H2O and 91% alcohol and weighed after drying. Results showed that the average weights of Cu plates and Al plates increased while that of iron plates decreased. The increase in weight for the Cu and Al plates was more significant during the first month of exposure. The corrosion rate of iron outside the cylindrical cover was about twice as fast than that inside the cover. The weight increases of Cu and Al plates were not dependent on SO2 concentration, while a significant difference in iron corrosion was found in polluted and non-polluted areas.

EFFECTS-ECONOMIC

1973

53225 **APTIC NO. 76854**

Hopper, W. C.

SUPPLEMENT TO CONCAWE REPORT NO. 12/72. THE PROBLEM OF GASOLINE ENGINE EXHAUST CONTROL. *Stichting CONCAWE, The Hague (Netherlands), Special Task Force on Gasoline Engine Exhaust Control, 25p., March 1973. 6 refs.*

Estimates of the additional cost of manufacturing low- or zero-lead gasoline throughout various European countries are presented. Variations in market requirements and refinery characteristics among different European countries reflect variations in the individual estimates. Generally speaking, the additional investments required for the production of premium grade (98 octane rating) and regular grade (90-92 octane rating) gasolines in the proportions currently required by the market are as follows: $1.5-$5.5/ton (annual capacity) for 0.45 g/l lead; $2.4-$7.0/ton for 0.40 g/l lead; and $8.0-$23.0/ton for 0.15 g/l lead. (Author summary modified)

STANDARDS AND CRITERIA

1975

53226 **APTIC NO. 77437**

Kohayagawa, T.

PRESENT STATUS AND FUTURE OF AUTOMOTIVE EMISSION CONTROL STANDARDS. (2). *(Jidosha haishutsu gasu kisei no genjo to shorai (2)). Text in Japanese. Kikai ni Kenkyu (Science of Machine), 27(5):629-633, May 1975. 13 refs.*

Automotive exhaust emission control standards are evaluated. The 1973 carbon monoxide emission standard is sufficient from the standpoint of pollution control, and the more strict 1975 CO emission standard is unnecessary. Thee present hydrocarbon emission standard is ineffective for photochemical smog control. In the atmosphere of major cities such as Tokyo and Osaka, the photochemical reaction is facilitated by the decrease in HC. The reduction in HC concentration is only effective for photochemical smog control when it is maintained at less than 0.2-0.3 ppmC. The non-methane HC emission is not necessary from the standpoint of protecting human health. The photochemical smog is prevented if the nitrogen dioxide concentration is maintained at less than the 0.02 ppm of the environmental standard, regardless of HC concentration. The reduction in nitrogen oxides emission is effective for photochemical smog control. The 1975 NOx emission standard is 1.2 g/km and the 1976 NOx emission standard is 0.6 g/km. The proposed 1978 NOx emission standard of 0.25 g/km is extremely difficult to achieve both technically and economically.

53227 **APTIC NO. 76818**

Nishimura, H.

TECHNICAL POSSIBILITY OF THE PRACTICE OF THE 1976 REGULATION - COMMENT ON THE REPLY OF THE SPECIAL COMMITTEE. *(51 nen kisei jisshi no gijutsuteki kanosei (senmon iinkai toshin-sho hihan)). Text in Japanese. Kogai Kenkyu (Stud. Publ. Nuisance), 4(4):17-29, 1975. 9 refs.*

The 1976 Japanese regulations for automobile exhaust are reviewed. Topics include: The meaning of the 1976 regulations, a comparison with those in the United States, problems with the regulations, the present status of technical developments to achieve the regulations, problems related to stratified charge engines, and attitudes and techniques of the big car makers. In an appendix, information on the Kumagaya engines, fuel consumption of various engines, and problems of vibration is presented. The main purpose of the 1976 regulation is to decrease the amount of nitrogen oxides in the exhaust gas to 0.25 g/km. The average carbon monoxide, hydrocarbon, and NOx levels for the Honda stratified charge engines are 1.4, 0.125, and 0.5 g/km. It is possible to reduce this content further. For example, the NOx exhaust level can be reduced to 0.2-0.25 g/km. However, the driving characteristics of the cars deteriorate rapidly at these lower NOx levels. According to the opinions of Toyota and Nissan, the largest two car makers in Japan, the practical NOx content is 1.0-1.1 g/kg from the standpoint of the technological level of the Japanese car industry in 1976.

53228 **APTIC NO. 76811**

Yamamoto, T.

MOVEMENT OF THE COMMITTEE ON ENVIRONMENTAL POLLUTION BY INDUSTRY. *(Sangyo Kogai Bukai no ugoki ni tsuite). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), p. 32-36, June 1975.*

According to an investigation made the Japanese Ministry of International Trade and Industry, 1454 companies invested as much as $2,800,000,000 in 1974 for the prevention of environmental pollution. The planned investment for 1975 is about 1.4 times that of the previous year. Achievement of the standards for nitrogen oxides is doubtful based on the present level of technology. The Japanese standard is about five times more severe than that in the United States. The use of tetraethyl lead in gasoline is also discussed. Comparisons of the standards for various countries are given. The re-use of discarded materials is also discussed.

53229 **APTIC NO. 75449**

Abcor Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR FUEL CONVERSION (GROUP II). *Office of Air and Waste Management Contract, 79p., April 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide and particulate emissions from 13 thermal power plants which are candidates for fuel conversion from oil to coal firing are presented. The power plants investigated are located in the Metropolitan Philadelphia (New Jersey, Pennsylvania, and Delaware) Air Quality Control Region. Comparisons of the predicted maximum 24-hour SO2 and particulate concentrations under nominal and maximum load for each plant are tabulated along with the predicted maximum annual concentrations associated with various conversion alternatives. The results also show the influence of interactions between various plants. Predicted maximum annual SO2 and particulate concentrations under various fuel switching conditions range from 1-43 micrograms/cu m and from less than 1 to 14 micrograms/ cu m, respectively. Isopleth maps of pollutant concentrations are provided for individual plants.

53230 **APTIC NO. 75450**

Abcor Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR FUEL CONVERSION (GROUP III). *Office of Air and Waste Management Contract, 78p., April 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide and particulate emissions from 13 thermal power plants which are candidates for fuel conversion from oil to coal firing are presented. The power plants investigated are located in the following Air Quality Control Regions: National Capital, West Central Florida, Eastern Shore, Southern Maryland, Southern Central Plain, State Capital, and Hampton Roads. Comparisons of the predicted maximum 24-hour SO2 and particulate concentrations under nominal and maximum load for each plant are tabulated along with the predicted maximum annual concentrations associated with various conversion alternatives. The results also show the influence of interactions between various plants. Predicted maximum annual SO2 and particulate concentrations under various fuel switching conditions range from less than 1 to 52 micrograms/cu m and from less than 1 to 26 micrograms/cu m, respectively. Isopleth maps of pollutant concentrations are provided for individual plants.

53231 **APTIC NO. 75451**

Abcor Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR FUEL CONVERSION (GROUP IV). *Office of Air and Waste Management Contract, 75p., April 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide and particulate emissions from nine thermal power plants which are candidates for fuel conversion from oil to coal firing are presented. The power plants investigated are located in the following Air Quality Control Regions: New Hampshire-Maine, Metropolitan Boston, Metropolitan Providence, and Merrimack Valley-Southern New Hampshire. Comparisons of the predicted maximum 24-hour SO2 and particulate concentrations under nominal and maximum load for each plant are tabulated along with the predicted maximum annual concentrations associated with various conversion alternatives. The results also show the influence of interactions between various plants. Predicted maximum annual SO2 and particulate concentrations under various fuel switching conditions range from 2-67 micrograms/cu m and from less than 1 to 8 micrograms/ cu m, respectively. Isopleth maps of pollutant concentrations are provided for individual plants.

1973

53232 **APTIC NO. 75448**

Abcor Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR FUEL CONVERSION (GROUP I). *Office of Air and Waste Management Contract, 101p., April 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide and particulate emissions from 20 thermal power plants which are candidates for fuel conversion from oil to coal firing are presented. The power plants investigated are located in the following Air Quality Control Regions: New Jersey-New York-Connecticut, New Jersey, and Hudson Valley. Comparisons of the predicted maximum 24-hour SO2 and particulate concentrations under nominal and maximum load for each plant are tabulated along with the predicted maximum annual concentrations associated with various conversion alternatives. The results also show the influence of interactions between various plants. Predicted maximum annual SO2 and particulate concentrations under various fuel switching conditions range from less than 1 to 34 micrograms/cu m and from less than 1 to 8 micrograms/cu m, respectively. Isopleth maps of pollutant concentrations are provided for individual plants.

LEGAL AND ADMINISTRATIVE

1975

53233 **APTIC NO. 77542**

Ashby

CLEAN AIR OVER LONDON. *Clean Air, 5(17):25-31, Spring 1975. 45 refs.*

National and local clean air legislation in Great Britain is reviewed. Smoke was first recognized as a nuisance in 1819 and the first, but unsuccessful anti-smoke legislation was introduced into Parliament in 1821, 1843, and 1848. Initial control legislation was achieved in Newcastle upon Tyne and in the London area in 1853. The Public Health Act of 1891 is important because smoke control was transferred from the police to the sanitation department. An unsuccessful attempt was made to extend the legislation in 1904 to cover smoke from private dwellings. Until 1956 there were two revisions of the Public Health Act, one in 1926 which included smoke clauses and another in 1936. Smoke no longer had to be black to be a nuisance, but private homes were exempt from control. The fog of 1952 acted as a precipitant and public concern demanded new controls.

53234 **APTIC NO. 77558**

Baum, Robert

CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND ENGINES. PUBLIC HEARING. *Federal Register, 40(119):25851-25852, June 19, 1975.*

A public hearing is scheduled in response to proposed amendments and additions by the Environmental Protection Agency Administrator regarding Part 85 of the Code of Federal Regulations which would establish Selective Enforcement Auditing Procedure for the control of air pollution resulting from new motor vehicles. The hearing is to be limited to the following issues: the application of deterioration factors to measured vehicle emissions, vehicle sampling plans, test procedures, implementation of engineering changes, mileage accumulation prior to testing, appropriate numerical levels for an acceptable quality level and associated costs, and an appropriate effective date for the SEA program. The information adduced at the hearing is going to be part of the basis on which final regulations are to be promulgated.

53235 **APTIC NO. 77621**

Boddy, J. H., P. E. Bright, and G. S. Parkinson

AIR POLLUTION IN EUROPE AND THE FUEL SHORTAGE. *Clean Air, 5(17):5-10, Spring 1975. 9 refs.*

The development of emission control regulations in Europe is compared to the United States. The cost of the severe standards proposed for gasoline engines in the United States could reach $108.5 billion while in Europe significant reductions in carbon monoxide and hydrocarbons are achieved at minimal cost. Current and proposed European gasoline lead legislation are outlined. The effect on energy availability and high cost the legislation would incur, without producing any measurable benefit are detailed. Alternative means of reducing Pb emissions include trapping or filtering the Pb in the exhaust.

53236 **APTIC NO. 77555**

Gregory, James B.

MOTOR VEHICLE EMISSION INSPECTIONS. ESTABLISHMENT OF CRITERIA. *Federal Register, 40(113):24904-24906, June 11, 1975.*

A regulation to establish emissions inspection criteria for diagnostic inspection demonstration projects funded pursuant to the Motor Vehicle Information and Cost Savings Act is issued by the National Highway Safety Administration. The regulation is based on a notice of proposed rulemaking published June 11, 1974 and on comments submitted in response to the notice and is issued in consultation with the Environmental Protection Agency Administrator. The regulation and criteria outlined in it are effective immediately.

53237 **APTIC NO. 76864**

Hamanaka, Hironori

ON ENFORCEMENT OF TOTAL AMOUNT REGULATIONS FOR THE ATMOSPHERE. *(Taiki soryo kisei no jisshi ni tsuite). Text in Japanese. Kankyo Kenkyu (Environ. Studies), no. 9:2-11, March 1975.*

Enforcement of total-amount regulations for pollutants (in particular, sulfur oxides) is discussed. Flexibility and expandibility of the regulations are described. The total amount of emissions for SOx are based on stationary sources, but considerations of mobile pollutant sources such as ships and diesel-powered motor vehicles may become necessary. Standards are to be met by March 1978. Eleven specified high pollution regions where total amount regulations for SOx are to go into effect are located in the following prefectures: Chiba; Metropolitan Tokyo; Kanagawa; Shizuoka; Aichi (2 regions); Mie, Osaka, Hyogo, Okayama, Fukuoka. These regions occupy 1.9% of total land area, and 4.2% of habitable area of Japan. However, 23.2% of the population is located there, as well as 31.6% of soot-emitting facilities, 47.8% of liquid fuel usage, 31.9% of SOx emissions, and 63.8% of the petroleum refining capacity. Less than 40% of soot-emitting facilities, more than 60% of liquid fuel usage, and less than 50% of SOx emission amounts should come under total-amount regulations in the future. Reduction of SOx emissions can be accomplished by using low- sulfur fuel, or installing stack desulfurization equipment. Emission control measures and diffusion models for NOx are not as well-developed as those for SOx. Atmospheric diffusion models for pollutants, used in the calculation of total amount emission standards, must be relevant to the actual situations.

53238 **APTIC NO. 77433**

Higuchi, M. and O. Mitani

AN AIR POLLUTION MONITORING SYSTEM. *(Taiki osen no kankyo kanri shisutemu). Text in Japanese. Yokokawa Giho (Yokokawa Tech. Rept.), 19(1):15-22, 1975. 4 refs.*

In accordance with the air pollution monitoring system in Japan, enterprises which cooperate with monitoring stations are required to measure and report emissions of smoke, sulfur oxides, nitrogen oxides, and types of fuel used. Many enterprises are adopting environmental control systems, using electronic computers and automatic data processing units. Such air pollution monitoring systems, both hardware and software, are described.

53239 **APTIC NO. 77440**

Horn, Karlwilhem, Armin Knauer, and Peter Luederitz

CONSERVATION OF CLEAN AIR AND PROTECTION OF HUMAN HEALTH IN THE GERMAN DEMOCRATIC REPUBLIC. *(Luftreinhaltung und Gesundheitsschutz in der DDR). Text in German. Technik und Umweltschutz Luft Wasser Boden Laerm, no. 10:121-129, 1975.*

Because the reduction of air pollution is essential to the prevention of health impairment, the most important limitations with respect to emission standards are those based on health considerations. There must be differentiation between short- term and long-term norms in order to estimate the relationship between exposure and effect. When applied in conformity with the Fifth Executive Decree, the statutory limitations (values of maximum immission concentrations) restrict the frequency of hygienically admissible maximum concentrations. Although the non-observance of these limitations would not necessarily result in acute diseases, the risk of such diseases will increase with increasingly unfavorable amounts of exposure. Results of comparative measurements in various parts of the German Democratic Republic are also discussed.

53240 **APTIC NO. 77556**

McGlennon, John A. S.

MONTAUP ELECTRIC CO. ENERGY RELATED AUTHORITY; MODIFICATION OF PRIMARY STANDARD CONDITIONS. *Federal Register, 40(112):24767-24768, June 10, 1975.*

Modifications to Primary Standard Conditions on which a temporary suspension of certain Federal air pollution regulations as they applied to the burning of coal in boiler 8 of the Montaup Electric company's Somerset Station in Somerset, Massachusetts are presented by the Regional Administrator of the Environmental Protection Agency. Emission tests submitted by the company after the temporary suspension was granted indicate the particulate matter emissions are much greater than was expected based on information available before the company began burning coal in boiler 8. Thus the modifications, which are to take effect on June 9, 1975, are necessary to assure that the National Ambient Air Quality Standards for particulate matter will not be exceeded.

53241 **APTIC NO. 77563**

Mote, Victor L.

AIR RESOURCE MANAGEMENT IN SOVIET RUSSIA. *Proc. Am. Phil. Soc., 119(3):201-213, June 1975. 76 refs.*

Air resource management in Soviet Russia is discussed. Topics covered include: the historical background of interest in air pollution in the USSR; definitions of maximum permissible concentration and types of air quality standards (hygienic, sanitary, and technological); the organization of central and local bodies of air resource administration; the funding and distribution of air pollution abatement equipment; enforcement policies and procedures; and socio-economic consideration and their relationship to air resource management in the USSR.

53242 **APTIC NO. 77399**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. MISSOURI: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(73): 16844-16845, Part 1, April 15, 1975.*

The approval of revised compliance schedules for the state of Missouri is announced. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the federally approved state implementation plan. All schedules include incremental steps toward compliance with the applicable emission limitations.

53243 **APTIC NO. 77479**

Quarles, John

PREPARATION, ADOPTION, AND SUBMITTAL OF IMPLEMENTATION PLANS. MAINTENANCE OF NATIONAL AMBIENT AIR QUALITY STANDARDS. *Federal Register, 40(119):25814-25815, June 19, 1975.*

The Environmental Protection Agency Administrator amends 40 CFR 51.12 regarding the maintenance of National Ambient Air Quality Standards. The action rescinds the June 18, 1975 date for submission of analyses and implementation plans required to ensure maintenance of the national standards in Air Quality Maintenance Areas. Instead, the Administrator is going to specify individual schedules for these submissions for each identified AQMA. The Administrator finds good cause for promulgating these amendments in final form without first proposing them and subjecting them to public comment. Such a procedure is impractical in this situation since states must be able to rely on the amended time schedule immediately.

53244 **APTIC NO. 77482**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. APPROVAL OF REVISION OF THE STATE IMPLEMENTATION PLAN FOR THE DISTRICT OF COLUMIBA. *Federal Register, 40(121):26274-26275, June 13, 1975.*

Revisions to the state implementation plan proposed by the District of Columbia are approved by the Environmental Protection Agency Administrator. The revisions concern regulations governing the storage of petroleum products, the loading of volatile organic compounds or gasoline into tank trucks, trailers, and railroad cars, gasoline transfer vapor control, and control of dry cleaning solvent evaporation, as well as definitions of terms used in these regulations. Regulations dealing with the control of evaporative losses from the filling of vehicular tanks and the control of organic solvents are still being evaluated by EPA and are not approved at this time.

53245 **APTIC NO. 77553**

Quarles, John

CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES. LABELING AND IMPORTATION OF CATALYST-EQUIPPED VEHICLES. *Federal Register, 40(126):27448-27453, June 30, 1975.*

Regulations with respect to the importation and labeling of catalyst-equipped motor vehicles which were proposed by the Environmental Protection Agency and subsequently modified to reflect adopted comments by motor vehicle and motor vehicle engine manufacturers are promulgated. The regulations deny importation, except as a bonded entry, to all motor vehicles certified with catalysts which are driven outside the United States, Canada, and Mexico unless the vehicles are part of an internal control program operated by a vehicle manufacturer, the Department of State, or the Department of Defense and approved by the EPA Administrator. The regulations also include amendments to present labeling provisions. The regulations are effective 90 days from the date of promulgation (June 24, 1975).

53246 **APTIC NO. 77554**

Ravan, Jack E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. GEORGIA: PROPOSED COMPLIANCE SCHEDULES. *Federal Register, 40(125): 27248, June 27, 1975.*

Proposed compliance schedules submitted by the state of Georgia to the Environmental Protection Agency are listed. Each schedule establishes a date by which an individual air pollution source must attain compliance with an emission limitation of the state's implementation plan. In most cases the schedules include incremental steps toward compliance, with interim dates for achieving these steps also being included. Interested parties are encouraged to submit written comments on the proposed compliance schedules prior to approval/disapproval by the EPA Administrator.

53247 **APTIC NO. 77410**

Roberts, John J., Edward J. Croke, and Samuel Booras

A CRITICAL REVIEW OF THE EFFECT OF AIR POLLUTION CONTROL REGULATIONS ON LAND USE PLANNING. *J. Air Pollution Control Assoc., 25(5):500-520, May 1975. 146 refs.*

The integration of land use planning with air pollution control is discussed. Topics covered include: data bases and analytical methodologies necessary for defining the need for and effectiveness of air pollution control strategies incorporating land use and transportation related policies, emission allocation procedures, regional development planning, emission density zoning, zoning approval and other indirect regulatory controls, emission charges, tranportation controls, preferred land use based strategies, and the socio-economic impacts of land use-air pollution control strategies. The concept of emission density zoning, including transferable emission rights, is proposed as the most preferable way of synthesizing land use-based air pollution control programs. The potential value of emission

density zoning in establishing a spatially sensitive regional envelope of allowable emissions based on the regulation of land use follows from two key circumstances: the general inadequacy of available techniques for projecting the magnitude and distribution of future emissions and the fact that traditional point source controls make no provision for relatively uncontrolled growth.

53248 **APTIC NO. 77397**

Svore, Jerome H.

IMPLEMENTATION PLANS. IOWA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(56):12813-12814, March 21, 1975.*

The approval of revised compliance schedules for the state of Iowa are proposed. The compliance schedules are consistent with the approved control strategies of Iowa. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the federally approved state implementation plan. All schedules include incremental steps toward compliance with the applicable emission limitations. Under Iowa law, the compliance schedule is not enforceable after the date on which the associated variance expired and variances cannot extend for more than 1 yr. The approval of such compliance schedule is unconditional only as to that part of the schedule covered by the initial variance. Approval of the remainder of the schedule is conditioned upon the state s renewal of the variance in identical form and substance to that included in the schedule submitted to the Environmental Protection Agency and approved. Public comment is invited.

53249 **APTIC NO. 77398**

Svore, Jerome H.

IMPLEMENTATION PLANS. KANSAS: APPROVAL AND DISAPPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(56):12814-12815, March 21, 1975.*

The approval and disapproval of compliance schedules for the state of Kansas are proposed. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the federally approved state implementation plan. The following schedules are amendments to previously proposed compliance schedules: Colt Industries, Kansas City; Kiowa District Hospital, Kiowa; Kansas State University Health Center, Manhattan; Minneola District Hospital, Minneola; North Central Foundry, Enterprise, Cherokee; and Walton Foundry, Iola. The followed are Orders issued to sources on previously approved variances: McPherson County Highway Department, McPherson and Sherwin-Williams Chemicals, Coffeyville. Public comment is invited.

53250 **APTIC NO. 76817**

Tenya, Kazuo

THE ROLE OF SIMPLE MONITORING DEVICES IN CITIZEN INVOLVEMENT AND FUTURE TOPICS. *(Jumin undo ni okeru kan-i sokuteiki no yakuwari to kongo no kadai). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo, p. 296-297, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

The role of simple pollutant monitoring devices in encouragement of citizen participation in making pollutant measurements is discussed, and further topics for possible citizen involvement are listed. By these means citizens are made aware of the nature of pollution, and their interest is aroused. Since laymen can take measurements, pollution regulations do not become the sole province of officialdom. By the joint participation of many, the face of pollution in a given area is comprehensively characterized, and citizens are able to express their desires in the way of pollution control administration. Because of the involvement of many persons, grass-roots organization is strengthened. Since monitoring can be performed with ease, the fine details of pollution can be ascertained. At present, nitrogen dioxide monitoring has been the object of citizen participation with simple measuring devices, as in the comprehensive survey carried out in Ota Ward, Tokyo, Japan. The measuring device is a plastic tube with a lid, containing alkali filter paper. Air samples are collected by means of a pump of the type used in tropical fish tanks. This device can be adapted to measure other pollutants including oxidants, ammonia, cyanogen, sulfur oxides, and airborne particulates.

53251 **APTIC NO. 75453**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN LOS ANGELES AQCR 24. *Office of Air and Waste Management Contract, 38p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 16 thermal power plants located in the Metropolitan Los Angeles Air Quality Control Region (California) are presented as part of an effort to determine the air quality impact of such operations in the face of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum load operation from each of the 16 plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard. Emissions from the Burbank, Glendale, Haynes, Scattergood, Glenarm, Broadway, Alamitos, El Segundo, Huntington Beach, Mandalay, Redondo, San Bernardino, and Ormond Beach plants result in contributions to ambient air concentrations which by themselves do not exceed the primary annual SO2 standard. The ratio of the maximum concentration of ambient SO2 to the emission rate of the plants in micrograms/cu m per g/sec ranges from 0.047-7.8 and 0.031-4.0 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0089-1.7 for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

53252 **APTIC NO. 75454**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. NORTH CENTRAL COAST AQCR 25. *Office of Air and Waste Management Contract, 22p., Jan. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Moss Landing thermal power plant located in the North Central Coast Air Quality Control Region (California) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under nominal load operation from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 air quality standard; however, those under maximum load operation do exceed the primary 24-hour standard. Emissions from the plant do not result in the primary annual SO2 standard being exceeded. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.11 and 0.47 for nominal and maximum loads, respectively, on maximum concentration days and 0.014 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53253 **APTIC NO. 75455**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CON-

CENTRATIONS. NORTHEAST PLATEAU AQCR 26. Office of Air and Waste Management Contract, 23p., Jan. 1975. 3 refs.

Diffusion modeling analyses of sulfide dioxide emissions from the Humboldt Bay thermal power plant located in the Northeast Plateau Air Quality Control Region (California) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 0.069 and 0.32 for nominal and maximum loads, respectively, on maximum concentration days and 0.083 for the maximum annual concentration. These values indicate the relative pollution potential for the plant which is primarily a function of stack design as well as surrounding terrain features.

53254 **APTIC NO. 75456**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SAN DIEGO AQCR 29. *Office of Air and Waste Management Contract, 26p., Jan. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the San Diego Air Quality Control Region (California) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load operations from each of the plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.22-3.42 and 0.15-1.83 for nominal and maximum loads, respectively, on maximum concentration days and from 0.049-0.37 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53255 **APTIC NO. 75457**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SAN FRANCISCO BAY AREA AQCR 30. *Office of Air and Waste Management Contract, 30p., Jan. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from seven thermal power plants located in the San Francisco Bay Area Air Quality Control Region (California) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the Avon, Contra Costa, Hunters Point, and Potrero plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard; likewise for emissions under nominal loads from the Martinez, Oleum, and Pittsburg plants. Emissionns under maximum loads from Martinez, Oleum, and Pittsburg plants result in contributions to ambient air concentrations which by themselves do exceed the primary 24-hour SO2 standard. Emission from the Contra Costa and Hunters Point plants do not by themselves cause the primary annual SO2 standard to be exceeded. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.21-1.85 and 0.15-2.09 for nominal and maximum loads, respectively, on maximum concentration days from 0.028-0.042 (only two plants considered) for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53256 **APTIC NO. 75458**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SAN JOAQUIN VALLEY AQCR 31. *Office of Air and Waste Management Contract, 24p., March 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Kern thermal power plant located in the San Joaquin Valley Air Quality Control Region (California) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.55 and 0.34 for nominal and maximum loads, respectively, on maximum concentration days and 0.13 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53257 **APTIC NO. 75491**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. MANSFIELD-MARION AQCR 175. *Office of Air and Waste Management Contract, 24p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Shelby thermal power plant located in the Mansfield-Marion Air Quality Control Region (Ohio) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load operations from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.64 and 0.42 for nominal and maximum loads, respectively, on maximum concentration days and 0.036 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53258 **APTIC NO. 75493**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SANDUSKY AQCR 180. *Office of Air and Waste Management Contract, 23p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Norwalk steam plant located in the Sandusky Air Quality Control Region (Ohio) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 1.9 and 1.5 for nominal and maximum loads, respectively, on maximum concentration days and 0.14 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53259 **APTIC NO. 75499**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. ABILENE-WICHITA FALLS AQCR 210. *Office of Air and Waste Management Contract, 27p., March 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal power plants located in the Abilene-Wichita Falls Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load from the power plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.17-3.7 and 0.19-2.6 for nominal and maximum loads, respectively, on maximum concentration days and from 0.052-0.67 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53260 **APTIC NO. 75500**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. AMARILLO-LUBBOCK AQCR 211. *Office of Air and Waste Management Contract, 28p., March 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from nine thermal power plants located in the Amarillo-Lubbock Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load operations from each of the plants individually result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.19-6.7 and from 0.20-6.0 for nominal loads and maximum loads, respectively, on maximum concentration days and from 0.026-0.95 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53261 **APTIC NO. 75501**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. AUSTIN-WACO AQCR 212. *Office of Air and Waste Management Contract, 26p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from seven thermal power plants located in the Austin-Waco Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load operations from each of the plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.034-3.2 and 0.029-2.0 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0030-0.59 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53262 **APTIC NO. 75502**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. BROWNSVILLE-LAREDO AQCR 213. *Office of Air and Waste Management Contract, 26p., March 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants in the Brownsville-Laredo Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from each of the plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.19-1.07 and 0.16-0.71 for nominal and maximum loads, respectively, on maximum concentration days and from 0.039-0.18 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53263 **APTIC NO. 75503**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. CORPUS CHRISTI-VICTORIA AQCR 214. *Office of Air and Waste Management Contract, 25p., March 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Corpus Christi-Victoria Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from each of the plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.10-0.21 and 0.076-0.21 for nominal and maximum loads, respectively, and from 0.012-0.033 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53264 **APTIC NO. 75504**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN DALLAS-FORTH WORTH AQCR 215. *Office of Air and Waste Management Contract, 43p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 15 thermal power plants located in the Metropolitan Dallas-Fort Worth Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the Denton, Dallas, Mountain Creek, North Lake, Parkdale, Lake Hubbard, Newman, Olinger, Handley, North Main, Eagle Mountain, Collin, and Valley plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. Emissions from the North Texas plant do exceed the primary annual SO2 standard, though not the 24-hour standard. Emissions under nominal load operations from the Miller plant do not exceed the 24-hour standard, while those under maximum load operations do exceed the 24-hour standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.061-3.5 and 0.025-3.4 for nominal and maximum loads, respectively, and from 0.0088-0.59 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53265 **APTIC NO. 75505**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN HOUSTON-GALVESTON AQCR 216. *Office of Air and Waste Management Contract, 32p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 10 thermal power plants located in the Metropolitan Houston-Galveston Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load operations from each of the 10 plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.043-1.04 and 0.043-0.59 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0048-0.13 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53266 **APTIC NO. 75506**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN SAN ANTONIO AQCR 217. *Office of Air and Waste Management Contract, 29p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from thermal power plants in the Metropolitan San Antonio Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from each of six power plants investigated result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard. Emissions from the Braunig, Mission Road, Tuttle, Leon Creek, and Sommers plants result in contributions to ambient air concentrations which by themselves do not exceed the primary annual SO2 standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.13-1.4 and 0.088-1.3 for nominal and maximum loads, respectively, on maximum concentration days and from 0.017-0.13 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53267 **APTIC NO. 75507**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. MIDLAND-ODESSA-SAN ANGELO AQCR 218. *Office of Air and Waste Management Contract, 26p., March 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal power plants located in the Midland-Odessa-San Angelo Air Quality Control Region (Texas) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from each of the five plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.48-2.3 and 0.31-1.6 for nominal and maximum loads, respectively, on maximum concentration days and from 0.053-0.43 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53268 **APTIC NO. 75508**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. CENTRAL VIRGINIA AQCR 222. *Office of Air and Waste Management Contract, 24p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emission from the Brantly thermal power plant located in the Central Virginia Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load from the plant result in contributions to ambient air concentrations which by themselves exceed the primary 24-hour SO2 standard but not the primary annual SO2 standard. The values of the ratio of the ambient SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 14 and 10 for nominal and maximum loads, respectively, on maximum concentration days and 1.4 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53269 **APTIC NO. 75511**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. KANAWHA VALLEY AQCR 234. *Office of Air and Waste Management Contract, 25p., Jan. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Kanawha Valley Air Quality Control Region (West Virginia) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the Kanawha River and Cabin Creek plants result in contributions to ambient air concentrations which by themselves exceed the primary 24-hour SO2 air quality standard. Emissions under both nominal and maximum loads from the Amos plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.019 (Amos) to 11.28 (Cabin Creek) and 0.021 (Amos) to 7.71 (Cabin Creek) for nominal and maximum loads, respectively, on maximum concentration days and is 0.00056 for the maximum annual concentration (Amos plant). These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53270 **APTIC NO. 75512**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTHEASTERN WISCONSIN AQCR 239. *Office of Air and Waste Management Contract, 24p., Feb. 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Commerce and Lakeside thermal power plants located in the Southeastern Wisconsin Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from each plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.13 (Commerce) to 0.21 (Lakeside) and 0.11 (Commerce) to 0.24 (Lakeside) for nominal and maximum loads, respectively, on maximum concentration days and from 0.015 (Lakeside) to 0.019 (Commerce) for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53271 **APTIC NO. 75540**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTH CENTRAL KANSAS AQCR 96 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-428, 21p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Abilene thermal power plant located in the North Central Kansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions from the power plant under either nominal or maximum load conditions produce contributions to ambient SO2 levels which by themselves do not exceed theprimary 24-hour standard. Emissions under nominal load conditions also produce contributions to ambient SO2 levels that do not exceed the primary annual standard for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 1.0 and 0.84 for nominal and maximum loads, respectively, on maximum concentration days and 0.14 for the maximum annual concentration. These values indicate the relative pollution potential of the plant. The impact of two new plants in the area must be analyzed prior to finalizing any decision relative to the air quality in the region.

53272 **APTIC NO. 75543**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTH CENTRAL KANSAS AQCR 99 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-429, 21p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the South Central Kansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions and resultant ground concentrations from each of the plants under both nominal and maximum load conditions do not by themselves exceed either the 24-hour or maximum annual concentration standards for SO2. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.29-1.8 and 0.21-0.51 for nominal and maximum loads, respectively, on maximum concentration days and from 0.034-0.28 for the maximum annual concentration. These values indicate the relative pollution potential for each plant.

53273 **APTIC NO. 75547**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHERN LOUISIANA-SOUTHEAST TEXAS AQCR 106 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-447, 36p., Feb. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 19 thermal power plants located in the Southern Louisiana-Southeast Texas Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. The SO2 emissions from each of the plants, when considered apart from the other plants and from all other sources, do not result in contributions to 24-hour or annual SO2 concentrations which exceed the corresponding air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.17-7.6 and 0.14-7.4 for nominal and maximum loads, respectively, on maximum concentration days and from 0.12-1.1 for the maximum annual concentration. These values indicate the relative pollution potential for each plant. Further analysis is recommended for some of the plants prior to any decision bearing on the air quality in their vicinities.

53274 **APTIC NO. 75549**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN UPPER MICHIGAN AQCR 126 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-415, 20p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Presque Isle thermal power plant located in the Upper Michigan Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions under nominal and maximum load conditions from the plant result in contributions to ambient air concentrations which by themselves do not exceed the 24-hour and maximum annual standards for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.57 and 0.60 for nominal and maximum loads, respectively, on maximum concentration days and 0.047 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

53275 **APTIC NO. 75550**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN CENTRAL MINNESOTA AQCR 127 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-441, 21p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from United Power Association s Elk River thermal power plant located in the Central Minnesota Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the Elk River plant at nominal load do not by themselves result in contributions to 24 hour ground level SO2 concentrations which exceed the Federal air quality standard; however, the standard is exceeded when the plant is operating under maximum load conditions. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 1.5 and 1.6 for nominal and maximum loads, respectively, on maximum concentration days and 0.18 for the maximum annual concentration. These values indicate the relative pollution potential of the plant. The future operation of the new Sherbourne plant may have a detrimental impact on SO2 air quality in the Central Minnesota AQCR, and an impact analysis is recommended prior to decisions bearing on the future air quality of the region.

53276 **APTIC NO. 75552**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHWEST MINNESOTA AQCR 133 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-423, 20p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from Northern States Power Company s Minnesota Valley thermal power plant located in the Southwest Minnesota Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant during both nominal and maximum load operation do not by themselves result in ground level SO2 concentrations which exceed either the 24-hour or average annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.75 and 0.61 for nominal and maximum loads, respectively, on maximum concentration days and 0.050 for the maximum annual average concentration. These values indicate the relative pollution potential of the plant.

53277 **APTIC NO. 75555**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHEAST MISSOURI AQCR 138 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-440, 21p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the City of New Madrid thermal power plant located in the Southeast Missouri Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant during both nominal and maximum load operation (when considered separately from all other sources) produce contributions to the 24-hour and annual ambient SO2 concentrations which by themselves do not exceed the corresponding Federal air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.070 and 0.043 for nominal and maximum loads, respectively, on maximum concentration days and 0.0024 for the maximum annual concentration. These values indicate the relative pollution potential of the plant. The future operation of a new 600 MW coal burning unit at the plant may result in significant SO2 air quality degradation in the area, and an impact analysis of this unit is recommended prior to making decisions bearing on the future air quality of the region.

53278 **APTIC NO. 75564**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN PECOS-PERMIAN BASIN AQCR 155 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. 439, 22p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Pecos-Permian Basin Air Quality Control Region (New Mexico) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions of SO2 under either nominal or maximum load conditions from each power plant (considered separately from other sources) produce maximum contributions to ambient 24-hour SO2 concentrations which by themselves do not exceed the Federal 24-hour standard. Emissions under nominal load conditions from each plant (considered separately) produce maximum contributions to ambient SO2 levels which are negligible in comparison with the annual average standard. The ratio of the ambient SO2 concentration to the emission rate of the plants in micrograms/cu m per g/sec ranges from 0.26-6.0 and 0.24-3.3 for nominal and maximum loads, respectively, on maximum concentration days and from 0.042-0.83 for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

53279 **APTIC NO. 75566**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN CENTRAL OKLAHOMA AQCR 184 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-432, 22p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal plants located in the Central Oklahoma Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions during both nominal and maximum load conditions from each plant (considered separately and apart from other sources) produce contributions to ambient SO2 concentrations which do not exceed the Federal 24-hour standard for SO2. Emissions under nominal load conditions from each plant result in contributions to SO2 levels which also do not exceed the annual standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.33-0.39 and 0.25-0.46 for nominal and maximum loads, respectively, on maximum concentration days and from 0.029-0.077 for the maximum annual concentration. These values indiate the relative pollution potential of each plant.

53280 **APTIC NO. 75568**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHEASTERN OKLAHOMA AQCR 186 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-433, 23p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the Northeastern Oklahoma Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from each of the four plants (when considered separately) result in 24-hour and annual average contributions to ground level SO2 concentrations which by themselves are negligible (less than 0.5 micrograms/cu m). The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.29-1.7 and 0.23-1.8 for nominal and maximum loads, respectively, on maximum concentration days and from 0.034-0.24 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. Further analysis of the impact of a new coal burning 550 MW unit in Muskogee is recommended before decisions bearing on the future air quality of the area are finalized.

53281 **APTIC NO. 75569**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHWESTERN OKLAHOMA AQCR 187 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-445, 21p., Feb. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Mooreland thermal power plant located in the Northwestern Oklahoma Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant do not by themselves result in 24-hour ground concentrations or annual average concentrations which approach the corresponding Federal air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.85 and 0.74 for nominal and maximum loads, respectively, on maximum concentration days and 0.11 for the maximum annual concentration. These values indicate the relative pollution potential of the plant. Future operation of a new 135 MW unit at this plant does not appear to endanger SO2 air quality in the area.

53282 **APTIC NO. 75570**

GEOMET Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHEASTERN OKLAHOMA AQCR 188 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-443, 26p., Feb. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Southeastern Oklahoma Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the Weleetka, Seminole, and Arbuckle plants do not by themselves produce ground level SO2 concentrations which approach the 24-hour ambient air quality standard under either nominal or maximum load conditions. The maximum annual average concentrations of SO2 attributable to emissions from the Seminole and Arbuckle plants are also well below the annual average SO2 air quality standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.33-1.5 and 0.23-1.2 for nominal and maximum loads, respectively, on maximum concentration days and from 0.044-0.20 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. The addition of two new units (567 MW each) to the existing 567 MW unit at the Seminole plant does not appear to endanger future SO2 air quality in the area as long as only gas is consumed.

53283 **APTIC NO. 75575**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN PUGET SOUND AQCR 229 (FINAL REPORT). *Environmental Protection Agency Contract 68-02-1483, Rept. 438, 20p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Puget Sound Power and Light Company s Shuffleton thermal power plant located in the Puget Sound Air Quality Control Region (Washington State) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Sulfur dioxide emissions from the plant result in contributions to ground level SO2 concentrations at nominal load which approach but do not exceed the 24-hour air quality standard, while emissions generated during maximum load conditions cause the 24-hour standard to be exceeded. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 4.2 and 3.0 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant. A more exhaustive analysis prior to any final evaluation of the plant is recommended.

53284 **APTIC NO. 76844**

THE BACKGROUND OF THE INITIAL ERROR. *(Shohoteki misu no umareru haikei). Text in Japanese. Jitsugyo No Nippon (Ind. Japan), no. 184:78-83, June 1975.*

The report of the 7 large Cities Investigative Commission on the problems of automotive emission standards is reviewed. The 7 cities include Tokyo, Kawasaki, Yokohama, Nagoya, Kyoto, Osaka, Kobe, many of which are said by the article to have reform-minded administrations. The Commission Report is said to be political, rather than scientific. Several newspapers (Yomiuri, Asahi) are criticized for praising the Commission Report uncritically, before checking technical data. The Commission is criticized for extrapolating pollution improvement data on the basis of a graph furnished by Toyota. The Commission asserted that automobiles with 2000 lb deadweight, which comprise more than half the sales, already had nitrogen oxides emission rates of 0.6 g/km. Consequently, by further use of exhaust gas recirculation to reduce NOx emissions to 0.4 g/km, 1976 standards can be met on schedule, with a lead time of 1-2 yr, contrary to the statements made by the automakers. It is asserted that the number, 2000 lb, on the graph furnished by Toyota, was the deadweight of the car plus 110 kg allowance for passengers. These smaller cars comprise less than 15% of the market, and do not figure significantly in the projected attainment of NOx standards.

53285 **APTIC NO. 76845**

SECRET DATA WITHHELD FROM THE PUBLIC. *(Kakusarete ita kakushi deta). Text in Japanese. Jitsugyo No Nippon (Ind. Japan), no. 1842:83-88, June 1975.*

The manipulation of catalyst data for NOx conversion from automobile exhaust emissions which began in September 1974, and had minimal results, is described. Gould, Asia-Pacific Ltd. purportedly succeeded in developing an NOx automotive exhaust catalyst (GEM 68), which more than met 1976 Japan automotive emission standards (0.25 g/km) when tested on a Bluebird U for 57,000 km. Toyota, and especially Nissan, which had technological ties with Gould, were criticized, particularly by the 7 large Cities Investigative Commission, for not using this technology. Detailed data on GEM 68 testing, including the Bluebird data, were submitted by the Gould Co. to the Environmental Protection Agency in January 1975. The data showed that on May 6, 1974, NOx emission increased from 0.38 to 0.49 g/km over a 6-mile driving distance. On May 7, 1974, after test-driving another 3 miles, NOx emission suddenly decreased to 0.20 g/km. No explanations were given. On June 27, 1974, in violation of Japanese testing requirements, oxidation catalysts (not GEM 68) on the automobile were replaced. Doubts as to the reliability of the data and the durability of the catalyst led to a confrontation between Nissan and Gould on October 3, 1974, in which Nissan demanded a retraction from Gould. At that point, Gould representatives purportedly decamped during the night.

53286 **APTIC NO. 76847**

Fukuoka Prefectural Government (Japan), Bureau of Public Health

AIR POLLUTION COUNTERMEASURES. *(Taiki osen taisaku). Text in Japanese. In: 1974 Environmental White Paper, p. 95-123, Jan. 1975.*

Air pollution countermeasures taken in Fukuoka Prefecture, Japan, in accordance with various 1973 air pollution control regulations for sulfur dioxide, carbon monoxide, airborne particulates, nitrogen dioxide, and photochemical oxidants, are reviewed. A telemetry network, covering the entire prefecture, has been in operation since September 1974. Pollutant values in compliance with the new standards were observed at only a few of the monitoring locations. In Fukuoka Prefecture, K values for sulfur oxides range from 4.67 to 17.5, under the standards established on April 1, 1974. Maximum ground concentrations (ppm) are proportional to K values: A K value of 17.5 corresponds to SOx concentration of 0.03 ppm. In Fukuoka Prefecture, at the end of 1973, there were 4612 soot-emitting facilities in 1897 enterprises, registered according to law. Forty percent of the facilities were located in Kitakyushu City. A system of alerts for sulfur oxides and photochemical smog has been established, in cooperation with Kumamoto Prefecture. On-site factory inspections have been conducted for sulfur oxides, soot, and toxic substances. Environmental protection agreements have been made by various Fukuoka cities and industries located in them. Emissions of cadmium (zinc refinery, Omuta City; emission standard, 1 mg/N cu m) hydrogen fluoride (aluminum refinery, Omuta City; total amount standard, monthly average value of emission, based on hourly values, 4.64 kg/H). Wind tunnel experiments and diffusion calculations were conducted in Kitakyushu City and Omuta City. Fuel standards are being established.

53287 **APTIC NO. 77344**

Chiba Prefecture (Japan), Kashiwa Municipal Office

PRESENT SITUATION AND COUNTERMEASURES OF ENVIRONMENTAL POLLUTION. *(Kogai no genjo to taisaku). Text in Japanese. 140p., April 1975.*

Results of a survey on environmental pollution and its countermeasures in Kashiwa City are presented. General descriptions of the city (geography, population, land use) and the types of industry are given. Laws and ordinances, the organizational structure, budgets, monitoring systems, the pollution control council and other organizations related to the pollution control administration are described. Data on sulfur dioxide, photochemical smog, nitrogen oxides, suspended particulates, settling particulates, and carbon monoxide emissions are presented along with the formation mechanisms, measurement methods, and in some cases meteorological conditions. Water pollution in five major rivers and survey results of domestic and industrial sewage water and control measures are described. Survey results of noise and vibration pollution caused by industry, construction, traffic, odor pollution and land subsidization are presented with a description of control measures that were taken.

53288 **APTIC NO. 77436**

Arakawa Ward Office (Japan), Dept. of Construction and Environmental Pollution

ENVIRONMENTAL POLLUTION IN THE ARAKAWA WARD; SUPPLEMENT. *(Arakawa-ku no kogai). Text in Japanese. 45p., Jan.-March 1975.*

Environmental pollution data from the Arakawa ward for the period of January to March 1975 are presented. Data on building permits requested for factory and specified facilities, the number of permits applied for in accordance with the Tokyo Pollution Control Ordinance, and registration in accordance with the Noise Pollution Control Standard are given. Data on complaints filed, types of complaint, classification by zoning, and types of business are also presented. Environmental pollution by automobiles in terms of carbon monoxide concentration, traffic volume, and noise was investigated at intersections. The concentrations of nitric oxide (average 1.2-3.7 pphm) and nitrogen dioxide (average 1.7-3.4 pphm) and sulfur dioxide (average 1.5-3.7 pphm) and results of analysis for heavy metals in suspended particulates are given with data on wind direction and velocity.

1974

53289 **APTIC NO. 77455**

Cohen, Alan S., John F. Tschanz, and Robert K. Seyfried

AN ECONOMIC EVALUATION OF THE PROPOSED ILLINOIS COMPLEX SOURCE REGULATION. *Argonne Natl. Lab., Argonne, Ill., Energy and Environmental Systems Div., Illinois Institute for Environmental Quality Contract 31-109-38-2890 and National Science Foundation Contracts AG-352 and GI32989A2, 154p., Aug. 1974.*

NTIS: ANL/ES-36

The costs of the federal indirect source and the proposed Illinois complex source regulations are compared. The analysis, delay, modification, and phasing costs associated with the regulations are discussed, and all but the phasing costs are quantified. The modification costs are the most important, and regional shopping centers incur the largest relative costs. Various parametric analyses are conducted to determine the sensitivity of the cost estimates to the apportionment scheme used in the regulation and to the federal new-car emission standards. (Author abstract)

53290 **APTIC NO. 76874**

Inoue, Ichiro

PROBLEMS IN THE PREVENTION OF FUTURE AIR POLLUTION. *(Korekarano taiki osen boshi no kadai). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(7):57-58, July 1974.*

Falling dust was a typical air pollutant in the latter half of the 1930 s, but gradually decreased in the 1940 s. Sulfur oxides on the other hand, are increasing. This is attributed to the use of petroleum instead of coal as an energy source, the use of dust collectors, and the development of new manufacturing techniques. The concentration of sulfur oxides has been decreasing since 1967 through countermeasures such as stack heightening, low-sulfur crude petroleum, a desulfurization of heavy oil, and desulfurization of exhaust gas. It is, on the other hand, difficult to estimate nitrogen dioxide concentrations due to the shortage of measuring stations in which NO2 is measured for 6000 hr during the year. The NO2 emissions from plants in which nitric acid is used to treat metal surfaces are regulated by local governments. Exhaust standards were not established satisfactorily in the past due to inadequate techniques. Three conventional control methods include the inhibition of nitrogen oxides, including the offset combustion method and the gas recycling method, the elimination of nitrogen oxides in exhaust gas, and the use of low-sulfur fuels.

53291 **APTIC NO. 77460**

Kuelske, S. and H. W. Lohse

THE SMOG ALARM SYSTEM OF NORTHRHINE-WESTFALIA WITH A DESCRIPTION OF THE TELEMETRIC MEASURING SYSTEM. *(Der Smogwarndienst des Landes Nordrhein-Westfalen mit einer Beschreibung des telemetrischen Messystems). Text in German. Landesanstalt fuer Immissions und Bodennutzungsschutz des Landes Nordhein-Westfalen, 10p., 1974. 6 refs.*

The smog alarm system of Northrhine-Westphalia, established between 1963 and 1965, has been changed extensively in 1972-1973 due to stricter regulations and the extension of former ordinances. The smog alarm system, consisting of measuring stations, dedicated transmission lines rented from the German Post Administration, and of a central computer, obtains 1-min values from the sampling stations, and forms 30-min averages. Sulfur dioxide as an indicator substance has been maintained. Alarm stage I is released whenever the SO2 concentration reaches 1 mg/cu m for at least 1 hr, if alarm stage II is possible within the next 24 hr, and if unfavorable meteorological conditions can be expected to persist for at least 2 days. The earlier limit concentration for the alarm stage I was 2.5 mg/cu m. Alarm stage II is released whenever an SO2 concentration of 2 mg/cu m is recorded for at least 3 hr, and the unfavorable meteorological conditions are expected to persist for 24 hr. The former limit value for the alarm stage II was 5 mg/cu m.

53292 **APTIC NO. 76876**

Murase, Akira

AUTOMATIC MONITORING SYSTEM FOR AIR POLLUTION IN KAWASAKI CITY. *(Kawasaki-shi ni okeru taiki osen jido kanshi shisutemu). Text in Japanese. Seikyu to Sekiyu Kagaku (Petrol. Petrochem.), 18(3):70-73, March 1974.*

A monitoring system for air pollution and an automatic monitoring system for sources of sulfurous acid gas, which are being adopted by Kawasaki City, are discussed. In the first system, data on 12 measuring items registered in seven locations are continuously transmitted through a telemeter by Nippon Telegraph and Telephone Public Corporation lines to an observation center. A map of Kawasaki City is depicted on a panel on which the H2SO3 and oxidant concentrations, wind velocity, and wind direction are indicated electrically. A data-indicator is also used in the monitoring system. An electric indicator in front of the Kawasaki City Hall indicates the concentration of sulfurous acid gas in Kawasaki, Taishi, and Tajima and that of carbon monoxide in and around Kawasaki City Hall. In the automatic monitoring system data on the concentration of sulfurous acid gas and fuel consumption are transmitted into an observation center in the same way as that described above.

53293 **APTIC NO. 75474**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN PROVIDENCE AQCR 120. *Office of Air and Waste Management Contract, 25p., Nov. 14, 1974. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Metropolitan Providence Air Quality Control Region (Massachusetts-Rhode Island) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the three plants result in contributions which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.072-1.70 and 0.079-1.16 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0036-0.16 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53294 **APTIC NO. 75475**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. MERRIMACK VALLEY-SOUTHERN NEW HAMPSHIRE AQCR 121. *Office of Air and Waste Management Contract, 22p., Nov. 22, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Merrimack thermal power plant located in the Merrimack Valley- Southern New Hampshire Air Quality Control Region (Massachusetts and New Hampshire) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions from the plant under both nominal and maximum loads result in contributions to ambient air concentrations which by themselves exceed the primary 24-hour SO2 air quality standard. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.36 and 0.37 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53295 **APTIC NO. 75485**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTHERN TIER WEST AQCR 164. *Office of Air and Waste Management Contract, 23p., Dec. 19, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Southern Tier West Air Quality Control Region (New York) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum load operations for the three plants result in contributions to ambient air concentrations which by themselves exceed the primary 24-hour SO2 air quality standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.23-6.64 and 0.021- 7.40 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53296 **APTIC NO. 75486**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. EASTERN MOUNTAIN AQCR 165. *Office of Air and Waste Management Contract, 26p., Oct. 31, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Cliffside and Marshall thermal power plants located in the Eastern Mountain Air Quality Control Region (North Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions from both plants under nominal and maximum loads result in contributions to ambient air concentrations which by themselves exceed the primary 24-hour SO2 air quality standard; however, emissions from the Cliffside plant do not result in the primary annual SO2 standard being exceeded. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.18-0.36 and 0.20-0.027 for nominal and maximum loads, respectively, on maximum concentration days and is 0.033 for the maximum annual concentration (Cliffside plant only). These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53297 **APTIC NO. 75487**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. EASTERN PIEDMONT AQCR 166. *Office of Air and Waste Management Contract, 25p., Oct. 31, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Cape Fear and Roxboro thermal power plants located in the Eastern Piedmont Air Quality Control Region (North Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions from both plants under nominal and maximum load operations result in contributions to ambient air concentrations which by themselves do not exceed the 24-hour and annual

SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.062-0.27 and 0.051-0.25 for nominal and maximum loads, respectively, on maximum concentration days from 0.0030-0.017 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53298 **APTIC NO. 75488**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SANDHILLS AQCR 169. *Office of Air and Waste Management Contract, 24p., Nov. 12, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Weatherspoon thermal power plant located in the Sandhills Air Quality Control Region (North Carolina) are presented as part of an efffort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.22 and 0.26 for nominal and maximum loads, respectively, on maximum concentration days and 0.024 for the maximum annual concentration. These values indicate the relative pollution potential for the plant which is primarily a function of stack design as well as surrounding terrain features.

53299 **APTIC NO. 75489**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTHERN COASTAL PLAIN AQCR 170. *Office of Air and Waste Management Contract, 24p., Nov. 22, 1974. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Lee thermal power plant located in the Southern Coastal Plain Air Quality Control Region (North Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.21 and 0.16 for nominal and maximum loads, respectively, on maximum concentration days and 0.011 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53300 **APTIC NO. 75490**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. WESTERN MOUNTAIN AQCR 171. *Office of Air and Waste Management Contract, 23p., Nov. 1974. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Asheville thermal power plant located in the Western Mountain Air Quality Control Region (North Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves exceed the 24-hour primary SO2 air quality standard. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.90 and 0.96 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53301 **APTIC NO. 75492**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN COLUMBUS AQCR 176. *Office of Air and Waste Management Contract, 24p., Feb. 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Columbus thermal power plant located in the Metropolitan Columbus Air Quality Control Region (Ohio) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel and compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 2.1 and 1.6 for nominal and maximum loads, respectively, on maximum concentration days and 0.28 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53302 **APTIC NO. 75494**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. COLUMBIA AQCR 200. *Office of Air and Waste Management Contract, 24p., Dec. 19, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emission from the Wateree and McMeekin thermal power plants in the Columbia Air Quality Control Region (South Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from both plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec ranges from 0.051-0.18 and 0.041-0.24 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0026-0.0146 for the maximum annual concentration. These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53303 **APTIC NO. 75495**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. FLORENCE AQCR 201. *Office of Air and Waste Management Contract, 23p., Dec. 19, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Robinson power plant located in the Florence Air Quality Control Region (South Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the Robinson plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The majority of SO2 emissions from the plant are due to coal use. The values of the ratio of the SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 0.21 and 0.23, respectively, for nominal and maximum loads on maximum concentration days and 0.020 for the maximum annual concentration. (Author conclusions modified)

53304 **APTIC NO. 75496**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. GREENVILLE-SPARTANBURG AQCR 202. *Office of Air and Waste Management Contract, 23p., Dec. 19, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Lee power plant in the Greenville-Spartanburg Air Quality Control Region (South Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the Lee power plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.49 and 0.48 for nominal and maximum loads, respectively, on maximum concentration days and 0.056 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53305 **APTIC NO. 75497**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. GREENWOOD AQCR 203. *Office of Air and Waste Management Contract, 23p., Dec. 19, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Greenwood thermal power plant located in the Greenwood Air Quality Control Region (South Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions from the plant under both nominal and maximum loads result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values of the ratio of the ambient SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 0.39 and 0.24 for nominal and maximum loads, respectively, on maximum concentration days and 0.053 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53306 **APTIC NO. 75498**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. GEORGETOWN AQCR 204. *Office of Air and Waste Management Contract, 23p., Dec. 19, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Grainger thermal power plant located in the Georgetown Air Quality Control Region (South Carolina) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions from the plant under both nominal and maximum loads result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values of the ratio of the ambient SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 0.14 and 0.13 for nominal and maximum loads, respectively, on maximum concentration days and 0.0096 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53307 **APTIC NO. 75509**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. NORTHEASTERN VIRGINIA AQCR 224. *Office of Air and Waste Management Contract, 22p., Dec. 20, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Bremo Bluff thermal power plant located in the Northeastern Virginia Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 air quality standards. The values of the ratio of the ambient SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 0.44 and 0.34 for nominal and maximum loads, respectively, on maximum concentration days and 0.035 for the maximum annual concentration. These values indicate the relative pollution potential of the plant which is primarily a function of stack design as well as surrounding terrain features.

53308 **APTIC NO. 75510**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. VALLEY OF VIRGINIA AQCR 226. *Office of Air and Waste Management Contract, 24p., Oct. 29, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from two thermal power plants located in the Valley of Virginia Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Emissions under both nominal and maximum loads from the Riverton plant result in contributions to ambient air concentrations which by themselves do not exceed the 24-hour and annual SO2 air quality standards. Emissions under both nominal and maximum loads from the Glen Lyn plant result in contributions to ambient air concentrations which do exceed the 24-hour SO2 standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 1.65 (Glen Lyn) to 1.76 (Riverton) and 1.12 (Riverton) to 1.87 (Glen Lyn) for nominal and maximum loads, respectively, on maximum concentration days and is 0.10 for the maximum annual concentration (Riverton). These values indicate the relative pollution potential for each plant which is primarily a function of stack design as well as surrounding terrain features.

53309 **APTIC NO. 75539**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHEAST KANSAS AQCR 95 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-371, 21p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from two thermal power plants located in the Northeast Kansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use annd possible compliance schedule extensions. Emissions under nominal conditions from both plants result in contributions to the ambient air concentrations which by themselves do not exceed the 24-hour and annual SO2 standards. However, emissions under maximum load conditions from each plant result in contributions to ambient air concentrations which by themselves greatly exceed the 24-hour primary standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.28-0.48 and 0.39-0.51 for nominal and maximum loads, respectively, on maximum concentration days and from 0.022-0.045 for the maximum annual concentration. These values indicate the relative pollution potential for each plant.

53310 **APTIC NO. 75541**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHWEST KANSAS AQCR 097 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-391, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Mullergren thermal power plant located in the Northwest Kansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant at either nominal or maximum load result ground level SO2 concentrations which by themselves are negligible compared to either the 24-hour or annual average ambient air quality standards for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.71 and 0.69 for nominal and maximum loads, respectively, on maximum concentration days and 0.087 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

53311 **APTIC NO. 75542**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHEAST KANSAS AQCR 98 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-418, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from two thermal power plants located in the Southeast Kansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. The maximum annual average SO2 concentrations for both plants do not by themselves exceed the annual average air quality standard for SO2. Sulfur dioxide emissions from the Neosho plant do not by themselves result in ground level SO2 concentrations which exceed the 24-hour ambient air quality standards for SO2 under either nominal or maximum load conditions, whereas SO2 emissions from the Riverton plant result in ground level SO2 concentrations which do exceed the standard for the maximum load case. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.47-0.56 and 0.26-0.68 for nominal and maximum loads, respectively, on maximum concentration days and from 0.12-0.24 for the maximum annual concentration. These values indicate the relative pollution potential for each plant.

53312 **APTIC NO. 75544**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHWEST KANSAS AQCR 100 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-416, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from two thermal power plants located in the Southwest Kansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Sulfur dioxide emissions from either plant, when considered apart from all other sources, do not result in SO2 levels in excess of the 24-hour or annual air quality standards under either nominal or maximum load conditions. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.66-4.4 and 0.75-3.3 for nominal and maximum loads, respectively, on maximum concentration days and from 0.11-0.51 for the maximum annual concentration. These values indicate the relative pollution potential for each plant.

53313 **APTIC NO. 75545**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN APPALACHIAN AQCR 101 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-396, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Pineville thermal power plant located in the Appalachian Air Quality Control Region (Kentucky) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant, under both nominal and maximum load conditions, result in ground level SO2 concentrations which by themselves greatly exceed the 24-hour ambient air quality standard for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 8.2 and 9.2 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant. A more exhaustive analysis is recommended prior to finalizing any evaluation of the plant.

53314 **APTIC NO. 75546**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTH CENTRAL KENTUCKY AQCR 105 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-382, 20p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Cooper thermal power plant located in the South Central Kentucky Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions under nominal and maximum load conditions from the plant result in contributions to ambient air concentrations which by themselves exceed the 24-hour primary standard for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.42 and 0.35 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

53315 **APTIC NO. 75548**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN DETROIT-PORT HURON AQCR 123 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-372, 25p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from nine thermal power plants located in the Metropolitan Detroit-

Port Huron Air Quality Control Region (Michigan) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. None of the plants analyzed singularly exceed the annual average SO2 air quality standard; however, nominal load SO2 emissions from the St. Clair plant alone result in 24-hour ground level SO2 concentrations which exceed the ambient air quality standard. Maximum load SO2 emissions from the St. Clair and Mistersky plants (considered separately) result in 24-hour ground level SO2 concentrations which exceed the ambient air quality standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.042-0.47 and 0.038-0.54 for nominal and maximum loads, respectively, on maximum concentration days from 0.0012-0.042 for the maximum annual concentration. These values indicate the relative pollution potential for each plant. The installation of large new units at Port Huron and Monroe may be detrimental to air quality, especially in view of possible interactive effects caused by emissions from neighboring existing plants.

53316 **APTIC NO. 75551**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHWESTERN MINNESOTA AQCR 132 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-395, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Hoot Lake thermal power plant located in the Northwestern Minnesota Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant, under both nominal and maximum load conditions, do not result in ground level SO2 concentrations which by themselves exceed either the 24-hour or annual average ambient SO2 air quality standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.16 and 0.18 for nominal and maximum loads, respectively, on maximum concentration days and 0.015 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

53317 **APTIC NO. 75553**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN MISSISSIPPI DELTA AQCR 134 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-402, 22p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Delta thermal power plant located in the Mississippi Delta Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant during both nominal and maximum load operation result in contributions to ambient SO2 concentrations which by themselves exceed the 24-hour air quality standard. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 1.5 and 0.96 for nominal and maximum loads, respectively, on maximum concentration days and 0.097 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

53318 **APTIC NO. 75554**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHERN MISSOURI AQCR 137 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-379, 20p. Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Hill thermal power plant located in the Northern Missouri Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operationns in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant during both nominal and maximum load operation do not by themselves exceed either the primary 24-hour or the maximum annual concentration standards for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.046 and 0.054 for nominal and maximum loads, respectively, on maximum concentration days and 0.0026 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

53319 **APTIC NO. 75556**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHWEST MISSOURI AQCR 139 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-408, 22p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Southwest Missouri Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions during nominal load operation at the three plants result in contributions to ambient air concentrations which by themselves do not exceed the 24-hour SO2 standard. Emissions under maximum load conditions at the James River plant, however, result in contributions to ambient air SO2 levels which exceed the 24-hour standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.048-0.23 and 0.053-0.37 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0030-0.030 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. Further analysis is required for the James River plant and a proposed new plant to evaluate their impact on the Springfield area.

53320 **APTIC NO. 75557**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN MONTANA AQCR 140 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-387, 20p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Bird and Corette thermal power plants located in the Montana Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Sulfur dioxide emissions from the Bird plant alone result in the 24-hour SO2 ambient air quality standard being exceeded under both nominal and maximum load conditions. The values for the ratio of the ambient SO2 concentration to the emission rate of thee plant in micrograms/cu m per g/sec range from 0.67 (Corette) to 26 (Bird) and 0.54 (Corette) to 25 (Bird) for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of each plant. A more exhaustive analysis is recommended prior to finalizing any decision concerning these two plants.

53321 APTIC NO. 75558

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN MILES CITY AQCR 143 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-375, 21p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Lewis and Clark thermal power plant located in the Miles City Air Quality and Control Region (Montana) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant both during nominal and maximum load operation do not result in ground level concentrations which singularly exceed the 24-hour or annual average SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.69 and 0.76 for nominal and maximum loads, respectively, on maximum concentration days and 0.050 for the maximum annual concentration. These values indicate the relative pollution potential of the plant. Contributions to SO2 ground level concentrations by two new units to be installed at Colstrip, Montana may be significant in view of their size (350 MW each) and type of fuel to be consumed (coal).

53322 APTIC NO. 75559

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN LINCOLN-BEATRICE-FAIRBURY AQCR 145 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-413, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Lincoln and Sheldon thermal power plants located in the Lincoln-Beatrice-Fairbury Air Quality Control Region (Nebraska) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum load conditions from each plant result in contributions to ambient air concentrations which by themselves do not exceed either the 24-hour or annual SO2 standards. The ratio of the ambient SO2 concentration to the emission rate of the plant ranges from 0.19 (Sheldon) to 0.80 (Lincoln) and 0.18 (Sheldon) to 0.48 (Lincoln) for nominal and maximum loads, respectively, on maximum concentration days and from 0.024 (Sheldon) to 0.11 (Lincoln) for the maximum annual concentration. These values indicate the relative pollution potential of each plant.

53323 APTIC NO. 75560

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NEBRASKA AQCR 146 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-412, 23p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Bluffs and C. W. Burdick thermal power plants located in the Nebraska Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from each plant do not by themselves produce ground level concentrations which exceed the 24-hour or annual average standards for SO2 (annual average concentrations were not calculated for the Bluffs plant because of the complex terrain). The ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec ranges from 0.67 (Burdick) to 0.91 (Bluffs) for maximum loads and is 1.1 at each plant for nominal loads on maximum concentration days. The value of the ratio for the maximum annual concentration is 0.14 for the Burdick plant. These values indicate the relative pollution potential of each plant. A more exhaustive analysis is recommended before finalizing any decision concerning the Bluffs plant.

53324 APTIC NO. 75561

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHWEST NEVADA AQCR 148 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-388, 20p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Fort Churchill and Tracy thermal power plants located in the Northwest Nevada Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide concentrations due to emissions from both plants as well below the primary 24-hour air quality standard under nominal operating conditions. Under modeled maximum load conditions, Fort Churchill SO2 emissions approach the primary 24-hour air quality standard, while emissions from the Tracy facility slightly exceed the standard. The ratio of the ambient SO2 concentration to the emission rate of each plant ranges from 1.44 (Fort Churchill) to 12.76 (Tracy) and 1.49 (Fort Churchill) to 2.40 (Tracy) for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of each plant. A more exhaustive analysis is recommended before finalizing any decision concerning these two plants.

53325 APTIC NO. 75562

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN ALBUQUERQUE-MID RIO GRANDE AQCR 152 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-414, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Albuquerque-Mid Rio Grande Air Quality Control Region (New Mexico) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from either the Prager or Reeves plants, when considered apart from all other sources under nominal or maximum load operating conditions, do not result in ground level SO2 concentrations which by themselves exceed the 24-hour ambient air quality standard for SO2. Emissions from the Person plant do result in the 24-hour standard being exceeded during maximum load conditions. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 0.90-8.4 and 0.06-6.9 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential for each plant. A more exhaustive analysis is recommended before decisions concerning these plants are finalized.

53326 APTIC NO. 75563

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN EL PASO-LAS CRUCES-ALAMOGORDO AQCR 153 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-385, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from two thermal power plants in the El Paso-Las Cruces-Alamogordo Air Quality Control Region (Texas and New Mexico) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the Newman plant at either nominal or maximum load do not result in ground level SO2 concentrations which by themselves exceed the 24-hour ambient air quality standard. Emissions from the Rio Grande plant at nominal load result in ground level SO2 concentrations which by themselves approach the 24-hour standard, and SO2 emissions at maximum load result in ground level SO2 concentrations which greatly exceed the standard. The ratio of the ambient SO2 concentration to the emission rate for a given plant in micrograms/cu m per g/sec ranges from 3.8-5.8 and 3.9-6.7 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential for each plant. More exhaustive analyses are recommended for both plants before final decisions are made.

53327 **APTIC NO. 75565**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTH DAKOTA AQCR 172 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-365, 23p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the North Dakota Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Nominal load SO2 emissions from the power plants, when considered for each plant separately, do not result in ground level SO2 concentrations which exceed the 24-hour ambient air quality standard. Sulfur dioxide emissions from the R. M. Heskett plant during maximum load operation do result in 24-hour ground level SO2 concentrations which equal the ambient SO2 standard; the other three plants do not singularly emit enough SO2 at maximum load to produce ground level concentrations which equal the 24-hour standard. In no case does the interaction of SO2 emissions from plants result in ambient SO2 concentrations that exceed the annual or 24-hour standards. The ratio of the ambient SO2 concentration to the emission rate of the plants in micrograms/cu m per g/sec ranges from 0.14-1.38 and 0.18-1.23 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0065-0.073 for the maximum annual concentration. An analysis of the impact proposed additional units to the facilities is recommended.

53328 **APTIC NO. 75567**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTH CENTRAL OKLAHOMA AQCR 185 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-392, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from Oklahoma Gas and Electric Company s Osage thermal power plant located in the North Central Oklahoma Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant during either nominal or maximum load conditions result in ground level SO2 concentrations which by themselves are negligible compared with either the 24-hour or annual average ambient air quality standards for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 1.2 and 0.71 for nominal and maximum loads, respectively, on maximum concentration days and 0.18 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

53329 **APTIC NO. 75571**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN AQCR 189, SOUTHWEST OKLAHOMA (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-424, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Anadarko and Southwestern thermal power plants located in the Southwest Oklahoma Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions from either plant during both nominal and maximum load operation do not by themselves produce concentrations of SO2 which exceed either the 24-hour or annual average air quality standards. The ratio of the ambient SO2 concentration to the emission rate of the plants in micrograms/cu m per g/sec ranges from 0.89 (Southwestern) to 2.7 (Anadarko) and 1.0 (Southwestern) to 2.9 (Anadarko) for nominal and maximum loads, respectively, on maximum concentration days and from 0.13 (Southwestern) to 0.39 (Anadarko) for the maximum annual concentration. These values indicate the relative pollution potential for each plant.

53330 **APTIC NO. 75572**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN PORTLAND AQCR 193 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-417, 22p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Portland Air Quality Control Region (Oregon and Washington State) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Sulfur dioxide emissions from the Centralia plant, when considered apart from all other sources, result in contributions to the 24-hour ground level SO2 concentration which exceed the 24-hour standard during both nominal and maximum load, while emissions from either the Lincoln or Longview plants do not result in ground level SO2 levels which approach the 24-hour standard under either nominal or maximum load conditions. The ratio of the ambient SO2 concentration to the emission rate of the plants in micrograms/cu m per g/sec ranges from 0.31-2.6 and 0.27-3.0 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential for each plant. A more exhaustive analysis is recommended before any final decisions concerning the plants are made.

53331 **APTIC NO. 75573**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN UTAH AQCR 219 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-374, 20p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Utah Power and Light Company s Carbon thermal power plant located in the Utah Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions from the plant during both nominal and maximum load conditions result in calculated ground level SO2 concentrations which exceed the 24-hour ambient air quality standard by at least one order of magnitude. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 37 and 29 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

53332 **APTIC NO. 75574**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN WASATCH FRONT AQCR 220 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-422, 20p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Wasatch Front Air Quality Control Region (Utah) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Sulfur dioxide concentrations due to emissions from the Gadsby and Jordan plants do not exceed the Federal 24-hour air quality standard under either nominal or maximum load conditions, while those due to emissions from the Hale plant greatly exceed the 24-hour standard under both nominal and maximum load operations. The ratio of the ambient SO2 concentration to the emission rate of the plants in micrograms/cu m per g/sec ranges from 0.56-40 and 0.63-38 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of each plant. A more exhaustive analysis prior to finalizing any decisions concerning the three plants is recommended.

53333 **APTIC NO. 75576**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN LAKE MICHIGAN AQCR 237. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-366, 21p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the J. P. Pulliam and Edgewater thermal power plants located in the Lake Michigan Air Quality Control Region (Wisconsin) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and compliance schedule extensions. Sulfur dioxide levels resulting from emissions from each plant under nominal load conditions do not exceed the 24-hour or maximum annual air quality standards. Emissions under maximum load conditions at the J. P. Pulliam plant result in contributions to ambient air concentrations which by themselves exceed the 24-hour standard, while those from the Edgewater plant do not cause the 24-hour standard to be exceeded. The values for the ratio of the ambient SO2 concentration to the emission rate of the plants in micrograms/cu m per g/sec are 0.24 and 0.08 under nominal load and 0.23 and 0.10 under maximum load for the Pulliam and Edgewater plants, respectively, on maximum concentration days. The values for the maximum annual concentration are 0.023 and 0.030 for the Pulliam and Edgewater plants respectively. These values indicate the relative pollution potential of the plants.

53334 **APTIC NO. 75577**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTH CENTRAL WISCONSIN AQCR 238 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-407, 19p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Weston thermal power plant located in the North Central Wisconsin Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions from the Weston plant alone under both nominal and maximum load conditions result in contributions to ground concentrations of SO2 which exceed the 24-hour air quality standard. However, since the results for this plant are based on a valley model and must be assigned a lower degree of confidence, further analysis is recommended before decisions concerning the plant are finalized. The values for the ratio of the ambient SO2 concentration to the emission rate for the plant in micrograms/cu m per g/sec are 0.71 and 0.82 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

53335 **APTIC NO. 75578**

GEOMET Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTHERN WISCONSIN AQCR 240 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-411, 20p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Blount thermal power plant located in the Southern Wisconsin Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of changes in fuel use and possible compliance schedule extensions. The ambient SO2 level due to emissions from the plant under nominal and maximum load conditions is below that prescribed by the National Ambient Air Quality Standards. The values for the ratio of the maximum concentration of ambient SO2 to the emission rate of the plant in micrograms/cu m per g/sec are 0.20 and 0.21 for nominal and maximum loads, respectively, on maximum concentration days and 0.014 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

53336 **APTIC NO. 75579**

GEOMET Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN CASPER AQCR 241. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-370, 20p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Pacific Power and Light Company s Johnston plant located in the Casper Air Quality Control Region (Wyoming) are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Emissions from the thermal power plant alone result in the 24-hour SO2 standard being exceeded under both nominal and maximum load conditions. The emissions from one particular stack at the plant are responsible for over half of the maximum 24-hour concentration recorded at the plant under both nominal and maximum load conditions. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 0.79 and 0.67 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

53337 **APTIC NO. 75580**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN WYOMING AQCR 243 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-377, 18p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Naughton thermal power plant located in the Wyoming Air Quality Control Region are presented as part of an effort to determine the air quality impact of such operations in the face of possible changes in fuel use and possible compliance schedule extensions. Sulfur dioxide emissions under nominal and maximum load conditions from the power plant result in calculated contributions to ambient SO2 concentrations which by themselves exceed the 24-hour ambient air quality standard for SO2. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant in micrograms/cu m per g/sec are 2.4 and 2.6 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

53338 **APTIC NO. 76774**

Saitama Prefectural Government (Japan)

MALODOR POLLUTION. *(Akushu kogai). Text in Japanese. In: 1974 Environmental White Paper, p. 169-174, Dec. 1974.*

The status of malodor pollution, and malodor countermeasures in Saitama Prefecture, Japan, are discussed. In 1973, there were 801 malodor complaints by prefectural residents, among which were complaints about paint factories (12.7%), chicken and hog- raising operations (19.6%), incineration (8.4%), and food processing (5.2%). Unplanned, burgeoning urban development, mixing farm, factory, and residential areas, with attendant taxing of sewage and trash treatment facilities, formed the background for these complaints. In accordance with malodor control regulations, promulgated in June 1972, the Prefectural governor, in January 1974, designated part of the 36 cities and towns in the southern part of the prefecture, already regulated under Saitama Regional Pollution Control Planning, as malodor regulatory regions. Malodor standards for five chemicals are to be enforced by local authorities, and consist of quantitative and subjective standards for industrial areas (A) and other urban areas (B). Concentration standard (ppm) at the boundaries of plant grounds are: ammonia (A, 1; B, 2); methyl mercaptan (A, 0.002; B, 0.004); hydrogen sulfide (A, 0.02; B, 0.06); methyl sulfide (A, 0.01; B, 0.05); and trimethylamine (A, 0.005; B, 0.02). Subjective standards on a scale of 0-5 are: A (2.5, a weak, recognizable odor); B (3.0, easily recognizable odor). It is suggested that general malodor standards may have to be set up on the basis of subjective methods, since there are so many sources of odor.

53339 **APTIC NO. 76815**

Osaka Prefectural Government (Japan)

ENVIRONMENTAL POLLUTION CONTROL MEASURES: CONTROL BY THE LAW AND RULES. *(Taiki osen taisaku: Horitsu, jorei ni yoru kisei). Text in Japanese. In: Environmental White Paper in 1974, p. 175-223, Oct. 1974.*

The facilities subjected to control by the Air Pollution Control Law include 27 types of emission sources of flue gas containing sulfur oxides, particulate matter and toxic substances and five types of dust emission sources. In Osaka, the Flue Gas Emission Standard, Fuel Consumption Standard and standard concerning the structure, operation, and maintenance of dust emitting facilities are in effect. The emission standard for nitrogen oxides was established in August 1973. The standard for mandatory installation of pollution control devices and severe control standards for industrial location are also in effect. Data on the registration of flue gas emission source and dust emission sources are compiled and classified by city and type of emission source. The delegation of power for enforcing control standards and enforcement procedures are described. The air pollution control plan, constant monitoring system, emergency procedure, photochemical smog control measures, automotive exhaust emission control measures, and malodor control measures are also described.

53340 **APTIC NO. 76843**

Itami City Office, Osaka Prefecture

AIR POLLUTION COUNTERMEASURES. *(Taiki osen taisaku). Text in Japanese. Kogai No Gaikyo (The Outline of Pollution), p. 16-18, Dec. 1974.*

Countermeasures for smog, photochemical smog, and other pollution problems are described. Pollution prevention agreements were concluded between Itami City, in conjunction with Hyogo Prefecture, and 22 industries located in Itami City. Four levels of smog announcements (combinations of sulfur oxides concentrations and time factors) were established. The air pollution report, announced by Itami City, is the first level (continuous readings of 0.1 ppm sulfur oxides for 3 hr, up to 0.3 ppm SOx for 1 hr). The other three levels are announded by Hyogo Prefecture, and ranged from air pollution warnings (0.15-0.3 ppm SOx), air pollution alerts (0.5 ppm SOx), to air pollution emergency alerts (over 0.5 ppm SOx for 3 hr, over 0.7 ppm SOx for 2 hr). When an emergency alert occurs, SOx emissions from factories must be cut by over 80%. Photochemical smog announcements are made by Hyogo Prefecture, and are divided into 4 levels. The first level, photochemical smog forecast, is announced when the hourly average oxidant concentration at the monitoring station exceeds 0.10 ppm, and when meteorological conditions would contribute to worsening of the situation. Other levels include: photochemical smog warnings, hourly average oxidant concentrations over 0.15 ppm; photochemical smog alerts, hourly average oxidant concentrations over 0.30 ppm; serious photochemical smog alerts, hourly average oxidant concentrations over 0.50 ppm. Total emission of nitrogen oxides accompanying combustion in factories is cut 20-40% accordingly.

53341 **APTIC NO. 77453**

Air Resources Board, Sacramento, Calif.

RECOMMENDED RESPONSIBILITIES OF AIR RESOURCES BOARD TO LOCAL PLANNING AGENCIES (STAFF REPORT). *California Office of Planning and Research Grant CPA-CA-09-39-1032, Proj. CPA 1032.207, 35p., July 1974. 4 refs.*

NTIS: PB 237 868

The consideration of air quality by local and regional planning agencies is examined, along with the relationship of the state and local air pollution control agencies to local planning agencies. Two surveys of California planning agencies are used, one by the American Society of Planning Officials and one by the California Air Resources Board. Air quality was treated superficially when considered at all in most local general plans. Recommendations are made for strengthening the Air Resources Board s assistance to local jurisdictions to insure integration of air quality concerns into the land use planning process. (Author abstract modified)

53342 **APTIC NO. 77569**

AN OBSERVATION ON THE RELATIONSHIP BETWEEN NEW INDUSTRIAL SITE POLLUTION CONTROL MEASURES AND LOCAL PUBLIC ORGANIZATIONS. *(Ricchi kogai shisaku to chiho kogyo dantai to no kankei ni kansuru ichikosatsu). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(8):32-38, July 1974.*

The difficulty of industrial site selection is mainly caused by fear of plans for the development of electric power, steel, and other basic resources industries. The fear of pollution emissions, destruction of the natural environment, and endangering of safety are the main objections of public opinion, and these are usually caused by lack of objective information (lack of dependable environmental assessment or lack of trust in the safety of atomic power plants, etc.), distrust of industries making efforts for pollution prevention, and fear of the present technology s inability to control pollution. Other causes are the damaging effects of new industrial development on existing industries such as fishing and agriculture by damages due to water pollution, landfill, land settling, or soil pollution. In many cases, these opposition movements have successfully obstructed industrial developments. However, given assurances of safety, the wholesome development of industry and continuation of production are necessary in order to prevent price increases and land development for industrial purposes must be promoted under given rules. Presently, the relationship between the legal code and regulations or ordinances is fluid, and in some areas, contradictory. For instance, the Air Pollution Control Law designates across the board emission standards and recognizes local regulatory measures for more stringent standards. But in the case of sulfur oxides, the emission standard is set by the K index, and local standards are to be set in accordance with respective area s supply and demand of low sulfur oil regulated by the total national fuel demands and supplies. Therefore, local authorities cannot set the emission standards any more stringently than the calculated K figure emission standard. This seems to defeat the purpose of the air pollution control law.

1973

53343 **APTIC NO. 75411**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. CHATTANOOGA AQCR 55. *Office of Air and Water Programs Contract, 32p., Oct. 23, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from two power plants in the Chattanooga Air Quality Control Region (Georgia) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour and annual primary standards does not appear to be jeopardized in the region by the application of a limited variance to the Bowen plant. However, the standards most likely will not be met at the Hammond plant even under implementation plan status. The projected average sulfur content of coal used by power plants in the region under implementation plan regulations is 1.0% as compared to 2.5% for the nominal load case, 3.1% for the maximum load case, and 2.5% for the maximum concentration case. (Author conclusions modified)

53344 **APTIC NO. 75412**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. METRO. ATLANTA AQCR 56. *Office of Air and Water Programs Contract, 32p., Sept. 20, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three power plants located in the Metropolitan Atlanta Air Quality Control Region (Georgia) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low- sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard most likely will not be met even under implementation plan status at any of the three power plant sites in the region. The annual primary air quality standard is also not likely to be attained at any of the three sides under a variance status. The projected average sulfur content of coal used by power plants in the region under implementation plan regulations, nominal load, maximum load, and for the maximum concentration case is 0.7%. (Author conclusions modified)

53345 **APTIC NO. 75413**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. SAVANNAH-BEAUFORT AQCR 58. *Office of Air and Water Programs Contract, 34p., Oct. 8, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four power plants located in the Savannah-Beaufort Air Quality Control Region (Georgia and South Carolina) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low- sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standards appears likely at all four plant sites under implementation plan status. The projected average sulfur content of coal used by power plants in the region is 1.2% under implementation plan regulations, nominal load operations, maximum load operations, and for the maximum concentration case. (Author conclusions modified)

53346 **APTIC NO. 75414**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. SOUTHWEST GEORGIA AQCR 59. *Office of Air and Water Programs Contract, 31p., Sept. 14, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Mitchell power plant located in the Southwest Georgia Air Quality Control Region (Georgia and South Carolina) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standards does not appear to be jeopardized in the region by the application of full variance status to the Mitchell plant. The projected average sulfur content of coal used in the region is 0.7% under implementation plan regulations as compared with 1.7% for the nominal load, maximum load, and maximum concentration cases. (Author conclusions modified)

53347 **APTIC NO. 75415**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. BURLINGTON-KEOKUK AQCR 65. *Office of Air and Water Programs Contract, 32p., July 9, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five power plants located in the Burlington-Keokuk Air Quality Control Region (Illinois and Iowa) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized in the region by the application of full variance status to the Edwards, Wallace, Havana, and Burlington plants and a limited variance at the Powerton plant. The application of a full variance at each power plant site does not appear to endanger the annual primary air quality standard. The projected average sulfur content of coal used by power plants in the region is 0.95% under implementation plan regulations as compared with 3.12% for the nominal load case, 3.45% for the maximum load case, and 3.04% for the maximum concentration case. (Author conclusions modified)

53348 **APTIC NO. 75417**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. PADUCAH-CAIRO AQCR 72. *Office of Air and Water Programs Contract, 35p., June 15, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four power plants located in the Paducah-Cairo Air Quality Control Region (Illinois and Kentucky) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low- sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized in the region by the application of a limited variance to both the Green River and Paradise steam plants. Implementation plan status is indicated for the Joppa and the Shawnee steam plants. Attainment of the annual primary air quality standard does not appear to be endangered by the application of a full variance to the Joppa steam plant. Attainment of the annual standard for the other plants in the region may not be achieved under a variance status. The projected average sulfur content of coal in the region is 1.44% under implementation plan regulations, 2.17% under nominal load operations, 2.21% under maximum load operations, and 2.17% for the maximum concentration case. (Author conclusions modified)

53349 **APTIC NO. 75418**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. SOUTHEAST ILLINOIS AQCR 74. *Office of Air and Water Programs Contract, 30p., July 9, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Southeast Illinois Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized in the region by the application of implementation plan status to the Hutsonville plant but most likely cannot be met at the Grand Tower plant, even under implementation plan regulations. The coal sulfur content at both plants in 1971 was below implementation plan requirements. Attainment of the annual primary air quality standard also does not appear to be jeopardized by the application of implementation plan status to the Hutsonville plant. However, the Grand Tower plant exceeds the primary air quality standard even at implementation plan status. The projected average coal sulfur content for both power plants under all conditions is 2.3%. (Author conclusions modified)

53350 **APTIC NO. 75419**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. EVANSVILLE AQCR 77. *Office of Air and Water Programs Contract, 17p., June 18, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Evansville (Indiana and Kentucky) Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized in the region by the application of a limited variance to both the Culley station and the Kenneth C. Coleman plant and full variance for all other plants. Attainment of the primary air quality standard does not appear to be jeopardized by the application of a full variance to the Frank Ratts plant, the Petersburg plant, and the Gibson plant and a limited variance to the Culley station. For other plants in the region, attainment of the annual standard may not be achieved under a variance status. The projected average coal sulfur content for power plants in the region is 0.76% under implementation plan regulations, 2.99% under nominal load operations, 2.86% under maximum load operations, and 2.81% for the maximum concentration case. (Author conclusions modified)

53351 **APTIC NO. 75420**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. METROPOLITAN CINCINNATI AQCR 79. *Office of Air and Water Programs Contract, 35p., July 21, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five power plants located in the Metropolitan Cincinnati Air Quality Control Region (Ohio, Kentucky, and Indiana) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard as well as the annual primary standard does not appear to be jeopardized by the application of a full variance to the Hamilton and Ghent plants. The application of a limited variance to both the Tanners Creek and Miami Fort plants is not likely to endanger the attainment of the 24-hour or annual standards in the area. Implementation plan status is indicated for the Beckjord station. The average sulfur content of coal in the region is 0.6% under implementation plan regulations, 1.18% under applicable variance status for the nominal load case, 0.99% under applicable variance status for the maximum load case, and 0.92% under applicable variance for the maximum concentration case. (Author conclusions modified)

53352 **APTIC NO. 75421**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. SOUTH BEND AQCR 82. *Office of Air and Water Programs Contract, 30p., May 1, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the South Bend (Indiana and Michigan) Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variance for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. The application of a full variance to both power plants in the region does not appear to jeopardize attainment of the maximum 24-hour air quality standard or the annual primary air quality standard. The average coal sulfur content in the region is 0.7% under implementation plan regulations and 1.8% under full variance conditions. (Author conclusions modified)

53353 **APTIC NO. 75422**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. BLUEGRASS (LEXINGTON) AQCR 102. *Office of Air and Water Programs Contract, 11p., Sept. 14, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Bluegrass (Lexington, Kentucky) Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. The application of a full variance to the Brown plant does not appear to jeopardize the attainment of the 24-hour primary air quality standard or the annual primary standard. The 24-hour primary air quality standard does not appear likely to be met by the Tyrone and Dale plants, even under implementation status; however, the primary annual standard does not appear to be jeopardized under the same status. The projected average coal sulfur content used by power plants in this region is 1.9% under implementation plan regulations, nominal load operations, maximum load operations, and for the maximum concentration case. (Author conclusions modified)

53354 **APTIC NO. 75423**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. HUNTINGTON-ASHLAND-PORTSMOUTH-IRONTON AQCR 103. *Office of Air and Water Programs Contract, 35p., Sept. 25, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Huntington-Ashland-Portsmouth-Ironton (Ohio, West Virginia, and Kentucky) Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. The application of a full variance to the Gavin plant and limited variances to the Kyger Creek and J. M. Stuart plants do not appear to jeopardize attainment of either the 24-hour or annual primary air quality standard. The application of implementation plan status to the Philip Sporn and Big Sandy plants likewise is not likely to jeopardize either of the standards. The projected average sulfur content of coal used by the power plants in this region is 0.8% under implementation plan regulations as compared to 1.4% for the nominal load case, maximum load case, and maximum concentration case. (Author conclusions modified)

53355 **APTIC NO. 75424**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. CUMBERLAND-KEYSER AQCR 113. *Office of Air and Water Programs Contract, 30p., Aug. 10, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Cumberland-Keyser (West Virginia and Maryland) Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low- sulfur coal supply deficit. While attainment of the 24-hour primary air quality standard in the region does not appear to be jeopardized by the application of a full variance status to the Mt. Storm plant, attainment of the annual primary air quality standard may not be achieved as a result of full variance to this plant. Both the annual and the 24-hour standards do not appear jeopardized by the application of implementation plan status to the Smith plant. The projected average sulfur content of coal used by power plants in this region is 1.57% under implementation plan regulations as compared with 2.23% for the nominal load case, maximum load case, and maximum concentration case. (Author conclusions modified)

53356 **APTIC NO. 75425**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. CENTRAL MICHIGAN AQCR 122. *Office of Air and Water Programs Contract, 30p., Oct. 31, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Central Michigan Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. The application of full variances to the Saginaw and Campbell plants and limited variances to the Weadock, Karn, and Cobb plants does not appear to jeopardize the attainment of the 24-hour or annual primary air quality standard. The projected average sulfur content of coal used by power plants in the region is 0.9% under implementation plan regulations as compared with 2.4% for the nominal load case, 2.3% for the maximum load case, and 2.2% for the maximum concentration case. (Author conclusions modified)

53357 **APTIC NO. 75426**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. METROPOLITAN TOLEDO AQCR 124. *Office of Air and Water Programs Contract, 30p., Aug. 1, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Metropolitan Toledo (Ohio and Michigan) Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low- sulfur coal supply deficit. The application of a full variance to all plants in the region does not appear to jeopardize the attainment of the 24-hour primary air quality standard. Attainment of the annual primary standard is not likely to be jeopardized by the application of a full variance to both the Acme and Bay Shore stations. The standard may be exceeded, however, by the application of a variance to the J. R. Whiting or Monroe plants. The projected average sulfur content of coal used by power plants in the region is 1.34% under implementation plan regulations as compared with 2.84% at all other operating conditions. (Author conclusions modified)

53358 **APTIC NO. 75427**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. S. CENTRAL MICHIGAN AQCR 125. *Office of Air and Water Programs Contract, 29p., Aug. 7, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the South Central Michigan Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard is not likely to be jeopardized by the application of a full variance to the Ottawa and Harbor Beach plants, a limited variance to the Eckert and Erickson plants, and implementation plan status to the Elm Street plant. Attainment of the annual primary standard does not appear to be endangered by the application of full variances to all plants, except the Elm Street plant for which implementation status is required. The projected average sulfur content of coal used by power plants in the region is 1.48% under implementation plan regulations as compared with 2.55% under nominal load operations and 2.45% for maximum load operation and the maximum concentration case. (Author conclusions modified)

53359 **APTIC NO. 75428**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. SOUTHEAST MINNESOTA - LA CROSSE AQCR 128. *Office of Air and Water Programs Contract, 31p., July 21, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from power plants in the Southeast Minnesota-La Crosse Air Quality Control Region (Minnesota and Wisconsin) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the annual primary air quality standard is not likely to be jeopardized by the application of a full variance to all power plants in the region. Attainment of the 24-hour primary air quality standard does not appear endangered by the application of a full variance to the Fox Lake plant and the application of implementation plan status to the Alma plant, the Genoa number 3 plant, and the French Island plant. Attainment of the 24-hour standard is questionable at the Wilmarth and the Winona plant sites, even at implementation plan status. The projected average coal sulfur content for power plants in the region is 3.33% under implementation plan regulations as compared with 3.34% both for nominal load and maximum load operation and 3.33% for the maximum concentration case. (Author conclusions modified)

53360 **APTIC NO. 75429**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. DULUTH-SUPERIOR AQCR 129. *Office of Air and Water Programs Contract, 31p., Aug. 6, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three power plants in the Duluth-Superior Air Quality Control Region (Minnesota and Wisconsin) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard at the Clay Boswell station does not appear to be jeopardized under implementation plan status. However, the Aurora plant and the Hibbard station exceed the standard even at implementation plan status. Attainment of the annual primary standard appears feasible under implementation plan status. Thee projected average coal sulfur content for the power plants in the region is 0.96% under implementation plan status. (Author conclusions modified)

53361 APTIC NO. 75430

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. MINNEAPOLIS-ST. PAUL AQCR 131. *Office of Air and Water Programs Contract, 30p., July 26, 1973. 2 refs.*

Diffusion modeling analysis of sulfur dioxide emissions from four power plants in the Minneapolis-St. Paul Air Quality Control Region (Minnesota) are presented as part of an effort to determine the air quality impact of proposed variances for meeting implementation plan requirements in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized in the region by the application of a full variance to the King plant and a limited variance to the High Bridge plant. The predicted concentrations for the Riverside and Black Dog Plants indicate that the standard will be exceeded even under implementation plan status, primarily as a result of the mutual interaction effect between these sites. Attainment of the primary annual air quality standard does not appear to be endangered by the application of a full variance to the Black Dog, High Bridge, and King plants. The Riverside plant is presently operating below implementation plan regulation levels and is not expected to change. The projected average coal sulfur content used by power plants in the region is 1.41% under implementation plan regulations, 2.13% under nominal load operations, and 2.08% under maximum load and maximum concentration cases. (Author conclusions modified)

53362 APTIC NO. 75431

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. NE PENN.-UPPER DELAWARE VALLEY AQCR 151. *Office of Air and Water Programs Contract, 31p., Oct. 29, 1973. 1 ref.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal power plants located in the Northeast Pennsylvania-Upper Delaware Valley Air Quality Control Region (Pennsylvania and New Jersey) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard is not jeopardized by the application of implementation plan status to the Eyler plant. The standard can be exceeded at the Titus, Portland, Martin s Creek and Gilbert plants under implementation plan status. The projected average sulfur content of coal used in the region is 2.2% under implementation plan regulations and for the nominal load, maximum load, and maximum concentration cases. (Author conclusions modified)

53363 APTIC NO. 75432

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. METRO. CHARLOTTE 167. *Office of Air and Water Programs Contract, 32p., Oct. 8, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Metropolitan Charlotte Air Quality Control Region (North Carolina) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized in the region around the Buch plant under implementation plan status, though this standard is not likely to be achieved in the region at the Allen and Riverbend plants under such status. Attainment of the annual primary air quality standard appears likely at all plants. The projected average coal sulfur content used by power plants in the region is 1.1% under implementation plan regulations under nominal and maximum load operations and for the maximum concentration case. (Author conclusions modified)

53364 APTIC NO. 75433

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. METROPOLITAN CLEVELAND AQCR 174. *Office of Air and Water Programs Contract, 32p., July 27, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from seven thermal power plants located in the Metropolitan Cleveland Air Quality Control Region (Ohio) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standards is not jeopardized by the application of a full variance to the Avon Lake, Edgewater, and Painsville plants. The remaining plants require limited variance status to prevent the 24-hour and annual standards from being exceeded. The projected average sulfur content of coal used in the area is 0.6% under implementation plan regulations as compared with 2.30% for the nominal load case, 2.21% for the maximum load case, and 2.16% for the maximum concentration case. (Author conclusions modified)

53365 APTIC NO. 75434

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. METROPOLITAN COLUMBUS AQCR 176. *Office of Air and Water Programs Contract, 28p., Aug. 21, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Picway thermal power plant located in the Metropolitan Columbus Air Quality Control Region (Ohio) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard is not jeopardized in the region by the application of a limited variance to the plant. The application of a full variance to the plant does not appear to endanger the attainment of the annual primary standard. The projected average sulfur content of coal used in the region is 0.6% under implementation plan regulations as compared with 3.7% for the nominal load case and 2.5% for the maximum load and maximum concentration cases. (Author conclusions modified)

53366 APTIC NO. 75435

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. N. W. PENNSYLVANIA AQCR 178. *Office of Air and Water Programs Contract, 33p., Aug. 3, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from six thermal power plants located in the Northwest Pennsylvania Air Quality Control Region (Ohio and Pennsylvania) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard is not jeopardized by the application of a full variance to the Niles and Front Street plants and a limited variance to the Ashtabula plant. However, the standard can be exceeded at the Warren, Shawville, and New Castle plants even under implementation plan regulations. The application of a full variance to the Ashtabula, Niles, and Front Street plants does not endanger the attainment of the annual primary standard. The projected average sulfur contentt of coal used in the region is 1.41% under implementation plan regulations and 2.30% under nominal and maximum loads and for the maximum concentration case. (Author conclusions modified)

53367 **APTIC NO. 75436**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. PARKERSBURG AQCR 179. *Office of Air and Water Programs Contract, 32p., Aug. 1, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Parkersburg Air Quality Control Region (Ohio and West Virginia) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standards is not jeopardized by the application of a limited variance to the Poston and Muskingum River plants. Implementation plan status is indicated for the Willow Island plant. The projected average sulfur content of coal used in the region is 0.72% under implementation plan regulations, 1.63% under nominal load operations, 1.46% under maximum load operations, and 1.40% for the maximum concentration case. (Author conclusions modified)

53368 **APTIC NO. 75437**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. STEUBENVILLE AQCR 181. *Office of Air and Water Programs Contract, 34p., July 31, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from seven thermal plants located in the Steubenville Air Quality Control Region (Ohio and West Virginia) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard is not jeopardized by the application of a full variance to the Kammer, Toronto, and Mitchell plants and a limited variance to the Sammis plant. The 24-hour standard can be exceeded at the Cardinal, Burger, and Tidd plants, even under implementation plan status. Attainment of the annual primary standard is not endangered by the application of full variances to the Cardinal, Toronto, and Sammis plants; however, attainment of the annual standard may not be achieved under variance status for the Kammer and Mitchell plants. No assessment of the maximum annual average SO2 concentration associated with Burger and Tidd plants is available. The projected average sulfur content of coal used in the region is 0.96% under implementation plan regulations as compared with 2.18% for the nominal load case and 1.92% for the maximum load and maximum concentration cases. (Author conclusions modified)

53369 **APTIC NO. 75438**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. ZANESVILLE AQCR 183. *Office of Air and Water Programs Contract, 30p., June 28, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from two thermal power plants located in the Zanesville Air Quality Control Region (Ohio) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour air quality standard is not jeopardized under maximum load conditions by the application of a limited variance to either of the plants. The annual primary standard is also not jeopardized by the application of a full variance to the Conesville plant. The application of a full variance to the Philo plant, however, does endanger the attainment of the annual primary standard. The average sulfur content of coal used in the region is 0.58% under implementation plan regulations as compared with 2.87% for the nominal load case and 2.77% for the maximum load and maximum concentration cases. (Author conclusions modified)

53370 **APTIC NO. 75439**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. CENTRAL PENNSYLVANIA AQCR 195. *Office of Air and Water Programs Contract, 31p., Oct. 2, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the Central Pennsylvaniaa Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. The 24-hour primary air quality standard most likely cannot be met even under implementation plan status by any of the plants in the region. Attainment of the annual primary standard does not appear to be jeopardized in the region at the Montour plant which is operating at a coal percent sulfur not significantly different from implementation plan specifications. The projected average sulfur content of coal used in the region is 2.4% under implementation plan regulations, nominal load and maximum load operations, and maximum concentration conditions. (Author conclusions modified)

53371 **APTIC NO. 75440**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. S. CENTRAL PENNSYLVANIA AQCR 196. *Office of Air and Water Programs Contract, 31p., Aug. 21, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the South Central Pennsylvania Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standards does not appear to be jeopardized by the application of a full variance to the Brunner Island plant. Although the Crawford plant satisfies implementation plan status requirements, the 24-hour standard may be exceeded under full variance status. Attainment of the 24-hour standard is jeopardized at the Holtwood plant, even under implementation plan status; attainment of the annual standard is not jeopardized under this status. The projected average sulfur content of coal used by the plants is 2.35% under implementation plan regulations as compared with 2.52% for the nominal load and maximum concentration case and 2.54% for the maximum load case under applicable variance status. (Author conclusions modified)

53372 **APTIC NO. 75441**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. S. W. PENNSYLVANIA AQCR 197. *Office of Air and Water Programs Contract, 35p., Aug. 21, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 12 thermal power plants located in the South West Pennsylvania Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized in the region by the application of a full variance status to the Hatfield and Bruce-Mansfield plants and a limited variance to the Elrama and Mitchell plants. The standard most likely cannot be met even at implementation plan levels by the Cheswick, Phillips, Armstrong, Springdale, Conemaugh, and Seward plants. Attainment of the annual primary standard does not seem to be endangered by the application of full variances to the Cheswick, Hatfield, Conemaugh, and Bruce-Mansfield plants. The projected average sulfur content of coal used in the region under implementation plan regulations is 1.45% as compared with 2.20% for the nominal load, maximum load, and maximum concentration cases under applicable variance status. (Author conclusions modified)

53373 APTIC NO. 75442

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. CHARLESTON AQCR 199. *Office of Air and Water Programs Contract, 30p., Oct. 10, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Charleston Air Quality Control Region (South Carolina) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard most likely can be achieved at the Williams and Hagood plants under implementation plan status and will not be jeopardized in the region around the Jefferies plant under the same status. The annual primary air quality standard most likely can not be attained at any of the plants in the region. The projected average sulfur content of coal used by plants in the region is 1.1% under implementation plan regulations, nominal load operations, and maximum concentration conditions. (Author conclusions modified)

53374 APTIC NO. 75443

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. E. TENN.-S. W. VIRGINIA AQCR 207. *Office of Air and Water Programs Contract, 31p., June 8, 1973. 1 ref.*

Diffusion modeling analyses of five thermal power plants located in the East Tennessee-South West Virginia Air Quality Control Region (Tennessee and Virginia) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. The 24-hour primary air quality standard most likely cannot be met at the John Sevier and Kingston plants even under implementation plan regulations; the standard can be attained, however, at the Clinch River plant site under implementation plan status. Attainment of the 24-hour primary standard does not appear to be endangered by the application of limited variance to the Bull Run and the Watts Bar plants. The average sulfur content of coal in the region is 0.70% under implementation plan regulations, 0.97% under nominal loads, 0.86% under maximum loads, and 0.86% for the maximum concentration case. (Author conclusions modified)

53375 APTIC NO. 75444

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. MID-TENNESSEE AQCR 208. *Office of Air and Water Programs Contract, 30p., June 27, 1973. 2 refs.*

Diffusion modeling analyses of three thermal power plants located in the Mid-Tennessee Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low- sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standard does not appear to be jeopardized by the application of full variances to the Gallatin and Cumberland plants. Implementation plan status is necessary at the Johnsonville plant for the attainment of the 24-hour standard. The annual primary standard in the region of the Johnsonville plant appears to be endangered by the application of a full variance. The average sulfur content of coal used in the region is 0.70% under implementation plan regulations as compared with 3.00% for the nominal case, 3.09% for the maximum load case, and 3.00% for the maximum concentration case under applicable variance status. (Author conclusions modified)

53376 APTIC NO. 75445

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. HAMPTON ROADS (NORFOLK) AQCR 223. *Office of Air and Water Programs Contract, 27p., Oct. 18, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Hampton Roads Air Quality Control Region (Virginia) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Implementation plan status is indicated for all of the plants because they are projected to burn only residual oil. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized at the Reeves and Yorktown plants; however, the standard can be exceeded at the Portsmouth plant under implementation plan status. Attainment of the annual primary air quality standard does not appear to be endangered at any of the plants. (Author conclusions modified)

53377 APTIC NO. 75446

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. N. CENTRAL W. VIRGINIA AQCR 235. *Office of Air and Water Programs Contract, 30p., Sept. 13, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the North Central West Virginia Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standards does not appear to be jeopardized by the application of a full variance status to the Fort Martin and Harrison plants; however, the 24-hour standard most likely cannot be met at the Rivesville and Albright plants, even under implementation plan status. The projected average coal sulfur content in the area is 2.0% under implementation plan regulations as compared with 2.9% for nominal and maximum loads and the maximum concentration case. (Author conclusions modified)

53378 APTIC NO. 75447

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. SOUTHEASTERN WISCONSIN AQCR 239. *Office of Air and Water Programs Contract, 30p., Aug. 21, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal plants located in the Southeastern Wisconsin Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances to implementation plan regulations in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized under implementation plan status at the Port Washington, Valley, and Columbia plants; however, standard can be exceeded at the South Oak Creek and North Oak Creek plants under such status. Implementation plan status does not appear likely to endanger the annual primary air quality standard at any of the plants. The projected average coal sulfur content in the region is 1.93%. (Author conclusions modified)

53379 **APTIC NO. 76772**

Saitama Prefectural Government (Japan)

MALODORS. *(Akushu). Text in Japanese. In: 1973 Environmental White Paper, p. 162-164, Dec. 1973.*

Malodor problems in Saitama Prefecture, Japan, are discussed. The number of malodor complaints are second to noise and vibration complaints. Of 755 malodor complaints registered in 1972, from January through October, 14.3% were due to paint and finish- related facilities, 29% to livestock raising (pigs, chickens), and 8% to incineration. According to prefectural pollution control regulations, enterprises particularly prone to emitting malodors (such as pig and chicken raising and fat and oil processing) are to be registered with authorities before locating themselves. On-site inspections are also conducted. National government malodor control regulations have been in effect since May 1972. Standard concentrations of malodorous substances at plant boundaries are set. The establishment of regulatory regions and determination of standards are left to the discretion of the prefectural governors in consultation with local authorities. The exercise of regulatory powers on malodor sources located in the regulatory regions is delegated to the local authorities administering the respective regions. A representative malodor source, which needs reappraisal of location, storage, and processing practices, is a factory dealing in conversion of fish offal to fertilizer. From 10-100 tons/day of offal is processed and malodor problems abound.

1972

53380 **APTIC NO. 77343**

Survey Group for Environmental Pollution in Kashima Coastal Industrial Zone (Japan)

TO REGAIN POLLUTION-FREE KASHIMA: OVERALL INVESTIGATION REPORTS FOR ENVIRONMENTAL POLLUTION IN THE KASHIMA COASTAL INDUSTRIAL AREA. *(Kogai no nai Kashima o torimodisu tameni: Kashima rinkai kogyo chitai kogai monkai sogo chosa hokoku). Text in Japanese. 84p., July 1972.*

Results of an environmental pollution survey done in the Kashima industrial area in August 1971 are presented. The detection of cyan in suspended particulates was announced in an emergency meeting in October 1971. The present status of air pollution, suspended particulates, noise pollution, water pollution, industrial waste water disposal, the effect of Kashima harbor sewage disposal, and effect on plants are described. The environmental pollution control administration is discussed with regard to the prefectural and municipal control administrations, the designation of planned pollution control areas, the Ibargi Environmental Pollution White Paper concerning environmental pollution in Kashima and pollution by a thermal power plant, and the attitude of the prefectural office. The citizens movement against environmental pollution is described, as well as plans for environmental pollution control, characteristics of Kashima industrial development, and its effect on residents.

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